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Air Contaminants — Permissible Exposure Limits

**(Title 29 Code of Federal Regulations
Part 1910.1000)**



U. S. Department of Labor
Occupational Safety and Health Administration
1989 (Reprint)

OSHA 3112

L 35.6:

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Elizabeth Dole, Secretary

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INTRODUCTION

Soon after adoption of the Occupational Safety and Health Act in 1970, the Occupational Safety and Health Administration (OSHA) promulgated Permissible Exposure Limits (PELs) for many substances pursuant to the authority granted by Section 6(a) of the Act, which allowed the Agency to promulgate existing Federal standards or consensus standards as enforceable OSHA standards. Accordingly, the PELs identified in the Z-Tables of Title 29 Code of Federal Regulations, Part 1910.1000 (29 CFR 1910.1000) were adopted from regulations issued under the Walsh-Healey Public Contracts Act as existing Federal standards. These, in turn, were adopted from the 1968 Threshold Limit Values (TLVs) of the American Conference of Governmental Industrial Hygienists (ACGIH). Some consensus standards from the American Standards Association (now the American National Standards Institute (ANSI)) also were adopted at that time, following the Section (6a) procedures.

Industrial experience, new developments in technology, and available scientific data clearly indicate that in many instances those adopted limits are now obsolete and inadequate. Also, many new toxic materials commonly used in the workplace are not covered. These inadequacies are evidenced by the lower allowable exposure limits recommended by many technical, professional, industrial, and government organizations in the United States and elsewhere. In addition, these organizations have identified many other substances for which allowable exposure limits are needed to supplement the existing Z-Tables. Many large industrial organizations feel obligated to supplement the existing OSHA PELs with their own internal corporate guidelines.

OSHA, in the past, has focused its priorities on the development of detailed regulations for some high-priority substances. This has resulted in substance specific regulations for 24 substances. OSHA, however, has been unable to regulate the thousands of substances commonly found in the workplace, or to review the scientific information to determine whether different limits are required for the more than 400 substances regulated prior to 1988 under the provisions of the Z-Tables.

OSHA, therefore, determined it was necessary to augment the substance-by-substance approach through the use of a generic rulemaking, which would simultaneously cover many substances. The Hazard Communication Standard is an example of a regulation using such an approach. At this time, OSHA is also in the process of developing generic standards to cover respiratory protection, medical surveillance, and exposure monitoring. A major part of this generic approach to rulemaking is to modify the existing PELs and to establish PELs for substances for which no exposure limits previously existed. The existing health

literature and expert judgement indicate that such actions are required to protect against kidney and liver diseases, respiratory diseases, nerve disorders, carcinogenicity, irritation to various bodily organs, and many other deleterious health effects. Millions of employees are potentially exposed to substances of concern, and adoption of such a regulation represents a significant step in assuring the adequacy of health protection for workers.

DETAILS OF THE NEW STANDARD

OSHA therefore amended its existing Air Contaminants standard, 29 CFR 1910.1000, including Tables Z-1, Z-2 and Z-3. This amendment is limited to making more protective 212 PELs listed in these three tables, setting new PELs for 164 substances not previously regulated by OSHA, and retaining certain PELs unchanged. These changes include the revision of the PELs, the inclusion of Short Term Exposure Limits (STELs) to complement the 8-hour Time-Weighted Average (TWA) limits, the establishment of a designation for "skin" to protect against exposure by skin contact, and the addition of ceiling limits as appropriate.

The final regulation permits the use of any compliance methodology, until December 31, 1992, to achieve each revised PEL. During this period, however, the established OSHA hierarchy of controls with preference for engineering controls will be applied to achieve the level of the existing PELs. A single new Table, Z-1-A, includes all of the revised PELs and the existing OSHA PELs. Tables Z-2 and Z-3 are temporarily maintained since they contain limits that cannot be conveniently included in the format used in Table Z-1-A. The original Table Z-1 has been deleted from the regulation because all of the substances in that table have been included in the new Table Z-1-A. The design of this new Table Z-1-A makes identification of all changes to PELs possible by simply comparing the Transitional Limits at the left side of the table with the Revised Limits shown at the right side of the table. Table Z-1-A is included in this booklet following the section on regulatory text. The final regulation and this booklet also include Tables Z-2 and Z-3 because these limits could not be included in the Transitional Limits columns of Table Z-1-A due to format differences.

RISK REDUCTION AND FEASIBILITY

OSHA reviewed health, risk and feasibility evidence for all 428 substances for which changes to the PEL were considered. In each instance where a revised or new PEL was adopted, OSHA determined that the new limits substantially reduce significant risk of material health impairment among workers, and that new limits

are technologically and economically feasible. This determination is based on a complete review of the material referenced in the proposed rule issued on June 7, 1988, and a detailed review of the entire record for the rulemaking, including all comments, evidence, testimony and briefs submitted by the public during and after public hearings held from July 28 to August 16, 1988 in Washington, D.C.

For a small number of substances used in specific operations, the full record indicates that it is presently technically infeasible to achieve, through engineering controls, the PEL that is necessary based on available health information. For these specific instances, engineering controls to achieve the new PEL are required only where the Assistant Secretary demonstrates that such controls are feasible. These substances and operations are carbon monoxide and sulfur dioxide in specific foundry operations, carbon disulfide in selected rayon fiber and sausage casing manufacturing processes, and styrene in selected open molding boat manufacturing processes. Any methods of control may be used (in these identified situations) to achieve the new PELs.

PROTECTION

The revised PELs will protect workers against a wide variety of health effects that could cause material impairment of health or functional capacity. This includes protection against catastrophic effects such as cancer, cardiovascular, liver, and kidney damage; lung diseases, as well as more subtle effects resulting in central nervous system damage, narcosis, respiratory effects, and sensory irritation. For each substance, the health evidence in the record provides a substantial basis for establishing a new or revised PEL. OSHA utilized the already published and widely accepted Recommended Exposure Limits (RELs) developed by the National Institute for Occupational Safety and Health (NIOSH) and the TLVs published by the ACGIH. OSHA, however, reviewed the entire record and made an independent judgment to determine that the revised PEL was feasible and that significant risk would be reduced.

The revised standards will provide additional occupational health protection to approximately 4.5 million workers at an annual cost of approximately \$150 per employee protected. This cost is only a fraction of 1 percent of sales for all affected sectors.

OTHER STANDARDS

OSHA will continue its practice of rulemaking for individual substances when substance-specific regulations are necessary and

appropriate. OSHA also will continue its efforts to develop generic regulations to cover ancillary provisions required to supplement the PELs in 29 CFR 1910.1000.

COVERAGE

OSHA also has determined that it is appropriate to limit this rulemaking to the General Industry sector. This segment involves the largest number of workers and will result in the greatest benefit. Application to the Construction, Maritime and Agriculture segments will require examination of feasibility for these sectors and may require some modifications to this rule because of differences among these sectors. OSHA will pursue coverage for these sectors as part of second stage rulemaking and has informally notified the Advisory Committee on Construction Safety and Health of its plans.

The final Regulation covers a total of 600 substances, including the following:

- Addition of PELs for 164 new substances.
- Adoption of more protective PELs for 212 substances.
- No changes for 52 substances that were considered in this rulemaking.
- No change to existing PELs for 9 substances that are currently undergoing Section (6b) rulemaking.
- No change to existing PELs for 3 substances where some industry segments are not covered by the individual (6b) regulation (cotton dust, formaldehyde and benzene).
- No changes for PELs for 160 substances, that are unchanged, and were not evaluated during this rulemaking.

COMPLIANCE DATES

September 1, 1989, (6 months after the effective date of March 1) is the date for compliance with new or revised PELs, using any control methods. Approximately 4 years (December 31, 1992) following the regulation publication date, employers must comply with all PELs, with a preference for engineering controls. In the event that the planned OSHA regulation regarding revision to methods of compliance is not completed by December 31, 1991, the December 31, 1992 date will be delayed one year until December 31, 1993.

REGULATORY TEXT AND TABLES

The complete regulatory text preceding Table Z-1-A and the Table Z-1-A, Z-2 and Z-3 entries are as follows:

1910.1000 Air contaminants

An employee's exposure to any substance listed in Tables Z-1-A, Z-2 or Z-3 of this section shall be limited in accordance with the requirements of the following paragraphs of this section.

(a) Table Z-1-A:

(1) **Substances in Transitional Limits Columns with Limits Preceded by "C" - Ceiling Values.** An employee's exposure to any substance in Table Z-1-A under the Transitional Limits columns, the exposure limit of which is preceded by a "C", shall at no time exceed the exposure limit given for that substance in Table Z-1-A under the Transitional Limits columns.

(2) **Other Substances in Transitional Limits Columns-8-hour Time Weighted Average.** An employee's exposure to any substance in Table Z-1-A under the Transitional Limits columns, the exposure limit of which is not preceded by a "C", shall not exceed the 8-hour Time Weighted Average given for that substance in Table Z-1-A under the Transitional Limits columns in any 8-hour work shift of a 40-hour work week.

(3) **Final Rule Limits Columns.** An employee's exposure to any substance listed in Table Z-1-A shall not exceed the Time Weighted Average (TWA), Short Term Exposure Limit (STEL) and Ceiling Limit specified for that substance in Table Z-1-A under the Revised Limits columns.

(4) **Skin Designation.** To prevent or reduce skin absorption, an employee's skin exposure to substances listed in Table Z-1-A with an "X" in one or both of the Skin Designation columns, the designation "Skin" following the substance name shall be prevented or reduced to the extent necessary in the circumstances through the use of gloves, coveralls, goggles, or other appropriate personal protective equipment, engineering controls or work practices.

(5) **Definitions.** The following definitions are applicable to the Final Rule Limits columns of Table Z-1-A:

(i) **Time Weighted Average (TWA)** is the employee's average airborne exposure in any 8-hour work shift of a 40-hour work week which shall not be exceeded.

(ii) **Short term exposure limit (STEL)** is the employee's 15-minute time weighted average exposure which shall not be exceeded at any time during a work day unless another time limit

is specified in a parenthetical notation below the limit. If another time period is specified, the time weighted average exposure over that time limit shall not be exceeded at any time during the working day.

(iii) **Ceiling** is the employee's exposure which shall not be exceeded during any part of the work day. If instantaneous monitoring is not feasible, then the ceiling shall be assessed as a 15-minute time weighted average exposure which shall not be exceeded at any time over a working day.

(6) **Additional Definition.** The terms "substance," "air contaminant," and "material" are equivalent in meaning for 29 CFR 1910.1000.

(b) **Table Z-2:**

Table Z-2 is applicable for the transitional period and to the extent set forth in paragraph (f) of this section.

(1) **8-hour time weighted averages.** An employee's exposure to any material listed in Table Z-2, in any 8-hour work shift of a 40-hour work week, shall not exceed the 8-hour time weighted average limit given for that material in Table Z-2.

(2) **Acceptable Ceiling Concentrations.** An employee's exposure to a material listed in Table Z-2 shall not exceed at any time during an 8-hour shift the acceptable ceiling concentration limit given for the material in the table, except for a time period, and up to a concentration not exceeding the maximum duration and concentration allowed in the column under "acceptable maximum peak above the ceiling concentration for an 8-hour shift."

(3) **Example.** During an 8-hour work shift, an employee may be exposed to a concentration of Substance A (with a 10 ppm TWA, 25 ppm ceiling and 50 ppm peak) above 25 ppm (but never above 50 ppm) only for a maximum period of 10 minutes. Such exposure must be compensated by exposures to concentrations less than 10 p.p.m. so that the cumulative exposure for the entire 8-hour work shift does not exceed a weighted average of 10 p.p.m.

(c) **Table Z-3:**

Table Z-3 is applicable for the transitional period and to the extent set forth in paragraph (f) of this section. An employee's exposure to any substance listed in Table Z-3 in any 8-hour work shift of a 40-hour work week shall not exceed the 8-hour time weighted average limit given for that substance in the table.

(d) **Computation formulae:**

The computation formula which shall apply to employee exposure to more than one substance for which 8-Hour time weighted

averages are listed in Subpart Z of 29 CFR Part 1910 in order to determine whether an employee is exposed over the regulatory limit is as follows:

(1)(i) The cumulative exposure for an 8-hour work shift shall be computed as follows:

$$E = (C_a T_a + C_b T_b + \dots C_n T_n) \div 8$$

Where: **E** is the equivalent exposure for the working shift.
C is the concentration during any period of time **T** where the concentration remains constant.
T is the duration in hours of the exposure at the concentration **C**.

The value of **E** shall not exceed the 8-hour time weighted average specified in Subpart Z of 29 CFR 1910 for the material involved.

(ii) To illustrate the formula prescribed in paragraph (d)(1)(i) of this section, assume that Substance A has an 8-hour time weighted average limit of 100 ppm noted in Table Z-1-A. Assume that an employee is subject to the following exposure:

Two hours exposure at 150 p/m
Two hours exposure at 75 p/m
Four hours exposure at 50 p/m

Substituting this information in the formula, we have:

$$(2 \times 150 + 2 \times 75 + 4 \times 50) \div 8 = 81.25 \text{ p/m}$$

Since 81.25 ppm is less than 100 ppm, the 8-hour time weighted average limit, the exposure is acceptable.

(2)(i) In case of a mixture of air contaminants an employer shall compute the equivalent exposure as follows:

$$E_m = (C_1 \div L_1 + C_2 \div L_2) + \dots (C_n \div L_n)$$

Where: **E_m** is the equivalent exposure for the mixture.
C is the concentration of a particular contaminant.
L is the exposure limit for that substance specified in Subpart Z of 29 CFR Part 1910.

The value of **E_m** shall not exceed unity (1).

(ii) To illustrate the formula prescribed in paragraph (d)(2)(i) of this section, consider the following exposures:

Material	Actual concentration of 8-hour exposure (ppm)	8-hr. TWA PEL (ppm)
Substance B	500	1,000
Substance C	45	200
Substance D	40	200

Substituting in the formula, we have:

$$\begin{aligned}
 E_{\text{B}} &= 500/1,000 + 45/200 + 40/200 \\
 E_{\text{C}} &= 0.500 + 0.225 + 0.200 \\
 E_{\text{D}} &= 0.925
 \end{aligned}$$

Since E_{B} is less than unity (1), the exposure combination is within acceptable limits.

(e) To achieve compliance with paragraphs (a) through (d) of this section, administrative or engineering controls must first be determined and implemented whenever feasible. When such controls are not feasible to achieve full compliance, protective equipment or any other protective measures shall be used to keep the exposure of employees to air contaminants within the limits prescribed in this section. Any equipment and/or technical measures used for this purpose must be approved for each particular use by a competent industrial hygienist or other technically qualified person. Whenever respirators are used, their use shall comply with Section 1910.134.

(f) Effective dates; start-up dates and transitional provisions:

(1) **Effective date:** The effective date for the permissible exposure limits specified in the Final Rule Limits columns of Table Z-1-A is March 1, 1989.

(2) **Start-up dates:**

(i) The permissible exposure limits specified in the Final Rule Limits columns of Table Z-1-A shall be achieved by any reasonable combination of engineering controls, work practices and personal protective equipment effective September 1, 1989, through December 30, 1992.

(ii)(a) The permissible exposure limits specified in the Final Rule Limits columns of Table Z-1-A shall be achieved by the methods of compliance specified in paragraph (e) of this section effective December 31, 1992, if by December 31, 1991 a final rule

has been published in the **Federal Register** amending or determining not to amend paragraph (e) of this section.

(b) If no final rule has been published in the **Federal Register** by December 31, 1991, amending or determining not to amend paragraph (e) of this section, then the permissible limits specified in the Final Rule Limits columns of Table Z-1-A shall be achieved by the methods of compliance specified by paragraph (e) of this section effective December 31, 1993, and paragraph (f)(2)(i) of this section shall remain in effect through December 30, 1993.

(iii) The skin designations in the Final Rule Limits columns become effective September 1, 1989. The skin designations in the Transitional Limits columns are in effect from March 1, 1989 through August 31, 1989.

(3) **Transitional provisions:**

(i) The permissible exposure limits specified in the Transitional Limits column of Table Z-1-A, Table Z-2 and Table Z-3 shall continue to be achieved by the methods of compliance specified in paragraph (e) of this section through December 30, 1992. If paragraph (f)(2)(ii)(b) of this section takes effect, this provision is extended through December 30, 1993.

(ii) The permissible exposure limits specified in the Transitional Limits column of Table Z-1-A, Z-2 and Z-3 shall be applicable to the extent cross referenced in 29 CFR 1915, 1917 and 1918.

(iii) If any new or amended provisions or new or revised limits for any substance or substances are either administratively stayed or judicially stayed or vacated, then the existing provisions or limits for those substances specified in the Transitional Limits columns of Table Z-1-A, Table Z-2 or Table Z-3 shall remain in effect until such stay is lifted, or indefinitely, if the limit is vacated.

(4) Enforcement of the limits are indefinitely stayed for: aluminum alkyls; ethylidene norbornene; hexafluoroacetone; mercury (alkyl compounds); oxygen difluoride; phenylphosphine; and sulfur pentafluoride; until OSHA publishes in the **Federal Register** a notice that a sampling and analytical technique is available.

TABLE Z-1-A. Limits For Air Contaminants

Substance	CAS No.	Transitional Limits			Skin Designation	Final Rule Limits**						Skin Designation
		PEL*		TWA		STEL ^c		CEILING				
		ppm ^a	mg/m ³ ^b			ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b			
Acetaldehyde	75-07-0	200	360	-	100	180	150	270	-	-	-	-
Acetic acid	64-19-7	10	25	-	10	25	-	-	-	-	-	-
Acetic anhydride	108-24-7	5	20	-	-	-	-	-	5	20	-	-
Acetone	67-64-1	1000	2400	-	750	1800	1000	2400	-	-	-	-
Acetonitrile	75-05-8	40	70	-	40	70	60	105	-	-	-	-
2-Acetylaminofluorine; see 1910.1014	53-96-3											
Acetylene dichloride; see 1,2-Dichloroethylene												
Acetylene tetrabromide	79-27-6	1	14	-	1	14	-	-	-	-	-	-
Acetylsalicylic acid (Aspirin)	50-78-2	-	-	-	-	5	-	-	-	-	-	-
Acrolein	107-02-8	0.1	0.25	-	0.1	0.25	0.3	0.8	-	-	-	-
Acrylamide	79-06-1	-	0.3	X	-	0.03	-	-	-	-	-	X
Acrylic acid	79-10-7	-	-	-	10	30	-	-	-	-	-	X

TABLE Z-1-A. Limits For Air Contaminants

Substance	CAS No.	Transitional Limits			Skin Designation	Final Rule Limits**						
		PEL*		TWA		STEL ^c		CEILING		Skin Designation		
		ppm ^a	mg/m ³ ^b			ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b			
Acrylonitrile; see 1910.1045	107-13-1											
Aldrin	309-00-2	-	0.25	X	-	0.25	-	-	-	-	X	
Allyl alcohol	107-18-6	2	5	X	2	5	4	10	-	-	X	
Allyl chloride	107-05-1	1	3	-	1	3	2	6	-	-	-	
Allyl glycidyl ether (AGE)	106-92-3	(C)10	(C)45	-	5	22	10	44	-	-	-	
Allyl propyl disulfide	2179-59-1	2	12	-	2	12	3	18	-	-	-	
alpha-Alumina	1344-28-1											
Total dust		-	15	-	-	10	-	-	-	-	-	
Respirable fraction		-	5	-	-	5	-	-	-	-	-	
Aluminum (as Al)	7429-90-5											
Metal												
Total dust		-	15	-	-	15	-	-	-	-	-	
Respirable fraction		-	5	-	-	5	-	-	-	-	-	
Pyro powders		-	-	-	-	5	-	-	-	-	-	

TABLE Z-1-A. Limits For Air Contaminants

Substance	CAS No.	Transitional Limits		Skin Designation	Final Rule Limits**						Skin Designation
		PEL*			TWA	STEL ^c		CEILING			
		ppm ^a	mg/m ³ ^b			ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b		
Welding fumes***		-	-	-	-	5	-	-	-	-	-
Soluble salts		-	-	-	-	2	-	-	-	-	-
Alkyls		-	-	-	-	2	-	-	-	-	-
4-Aminodiphenyl; see 1910.1011	92-67-1										
2-Aminoethanol; see Ethanolamine											
2-Aminopyridine	504-29-0	0.5	2	-	0.5	2	-	-	-	-	-
Amitrole	61-82-5	-	-	-	-	0.2	-	-	-	-	-
Ammonia	7664-41-7	50	35	-	-	-	35	27	-	-	-
Ammonium chloride fume	12125-02-9	-	-	-	-	10	-	20	-	-	-
Ammonium sulfamate	7773-06-0										
Total dust		-	15	-	-	10	-	-	-	-	-
Respirable fraction		-	5	-	-	5	-	-	-	-	-
n-Amyl acetate	628-63-7	100	525	-	100	525	-	-	-	-	-
sec-Amyl acetate	626-38-0	125	650	-	125	650	-	-	-	-	-

TABLE Z-1-A. Limits For Air Contaminants

Substance	CAS No.	Transitional Limits			Skin Designation	Final Rule Limits**						Skin Designation
		PEL*		TWA		STEL ^c		CEILING				
		ppm ^a	mg/m ³ ^b			ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b			
Aniline and homologs	62-53-3	5	19	X	2	8	-	-	-	-	X	
Anisidine (o-,p-isomers)	29191-52-4	-	0.5	-	-	0.5	-	-	-	-	-	
Antimony and compounds (as Sb)	7440-36-0	-	0.5	-	-	0.5	-	-	-	-	-	
ANTU (Alpha naphthylthiourea)	86-08-4	-	0.3	-	-	0.3	-	-	-	-	-	
Arsenic, organic compounds (as As)	7440-38-2	-	0.5	-	-	0.5	-	-	-	-	-	
Arsenic, inorganic compounds (as As); see 1910.1018	Varies with compound	See 1910.1018(a) for applications excluded										
Arsine	7784-42-1	0.05	0.2	-	0.05	0.2	-	-	-	-	-	
Asbestos; see 1910.1001	Varies											
Atrazine	1912-24-9	-	-	-	-	5	-	-	-	-	-	
Azinphos-methyl	86-50-0	-	0.2	X	-	0.2	-	-	-	-	X	

TABLE Z-1-A. Limits For Air Contaminants

Substance	CAS No.	Transitional Limits		Skin Designation	Final Rule Limits**						Skin Designation
		PEL*			TWA		STEL ^c		CEILING		
		ppm ^a	mg/m ³ ^b		ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b	
Barium, soluble compounds (as Ba)	7440-39-3	-	0.5	-	-	0.5	-	-	-	-	-
Barium sulfate	7727-43-7	-	-	-	-	-	-	-	-	-	-
Total dust		-	15	-	-	10	-	-	-	-	-
Respirable fraction		-	5	-	-	5	-	-	-	-	-
Benomyl	17004-35-2	-	-	-	-	-	-	-	-	-	-
Total dust		-	15	-	-	10	-	-	-	-	-
Respirable fraction		-	5	-	-	5	-	-	-	-	-
Benzene; see 1910.1028	71-43-2	See Table Z-2 for the limits applicable in the operations or sectors excluded in 1910.1028 ^d									
Benzidine; see 1910.1010	92-87-5										
p-Benzoquinone; see Quinone											
Benzo(a)pyrene; see Coal tar pitch volatiles											

TABLE Z-1-A. Limits For Air Contaminants

Substance	CAS No.	Transitional Limits			Final Rule Limits**						Skin Designation
		PEL*		Skin Designation	TWA		STEL ^C		CEILING		
		ppm ^a	mg/m ³ ^b		ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b	
Benzoyl peroxide	94-36-0	-	5	-	-	5	-	-	-	-	-
Benzyl chloride	100-44-7	1	5	-	1	5	-	-	-	-	-
Beryllium and beryllium compounds (as Be)	7440-41-7	See Table Z-2			0.002	-	0.005	-	0.025	-	-
(30 min)											
Biphenyl; see Diphenyl											
Bismuth telluride, Undoped	1304-82-1										
Total dust		-	15	-	-	15	-	-	-	-	-
Respirable fraction		-	5	-	-	5	-	-	-	-	-
Bismuth telluride, Se-doped		-	-	-	-	5	-	-	-	-	-
Borates, tetra, sodium salts											
Anhydrous	1330-43-4	-	-	-	-	10	-	-	-	-	-
Decahydrate	1303-96-4	-	-	-	-	10	-	-	-	-	-
Pentahydrate	12179-04-3	-	-	-	-	10	-	-	-	-	-

TABLE Z-1-A. Limits For Air Contaminants

Substance	CAS No.	Transitional Limits		Skin Designation	Final Rule Limits**						Skin Designation
		PEL*			TWA		STEL ^c		CEILING		
		ppm ^a	mg/m ³ ^b		ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b	
Boron oxide	1303-86-2										
Total dust		-	15	-	-	10	-	-	-	-	-
Respirable fraction		-	5	-	-	5	-	-	-	-	-
Boron tribromide	10294-33-4	-	-	-	-	-	-	-	1	10	-
Boron trifluoride	7637-07-2	(C)1	(C)3	-	-	-	-	-	1	3	-
Bromacil	314-40-9	-	-	-	1	10	-	-	-	-	-
Bromine	7726-95-6	0.1	0.7	-	0.1	0.7	0.3	2	-	-	-
Bromine pentafluoride	7789-30-2	-	-	-	0.1	0.7	-	-	-	-	-
Bromoform	75-25-2	0.5	5	X	0.5	5	-	-	-	-	X
Butadiene (1,3-											
Butadiene)	106-99-0	1000	2200	-	In process of 6(b) rulemaking						
Butane	106-97-8	-	-	-	800	1900	-	-	-	-	-
Butanethiol; see Butyl mercaptan											
2-Butanone (Methyl ethyl ketone)	78-93-3	200	590	-	200	590	300	885	-	-	-
2-Butoxyethanol	111-76-2	50	240	X	25	120	-	-	-	-	X

TABLE Z-1-A. Limits For Air Contaminants

Substance	CAS No.	Transitional Limits		Skin Designation	Final Rule Limits**						Skin Designation
		PEL*			TWA		STEL ^C		CEILING		
		ppm ^a	mg/m ³ ^b		ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b	
n-Butyl acetate	123-86-4	150	710	-	150	710	200	950	-	-	-
sec-Butyl acetate	105-46-4	200	950	-	200	950	-	-	-	-	-
tert-Butyl acetate	540-88-5	200	950	-	200	950	-	-	-	-	-
Butyl acrylate	141-32-2	-	-	-	10	55	-	-	-	-	-
n-Butyl alcohol	71-36-3	100	300	-	-	-	-	-	50	150	X
sec-Butyl alcohol	78-92-2	150	450	-	100	305	-	-	-	-	-
tert-Butyl alcohol	75-65-0	100	300	-	100	300	150	450	-	-	-
Butylamine	109-73-9	(C)5	(C)15	X	-	-	-	-	5	15	X
tert-Butyl chromate (as CrO ₃)	1189-85-1	-	(C)0.1	X	-	-	-	-	-	0.1	X
n-Butyl glycidyl ether (BGE)	2426-08-6	50	270	-	25	135	-	-	-	-	-
n-Butyl lactate	138-22-7	-	-	-	5	25	-	-	-	-	-
Butyl mercaptan	109-79-5	10	35	-	0.5	1.5	-	-	-	-	-
o-sec-Butylphenol	89-72-5	-	-	-	5	30	-	-	-	-	X
p-tert-Butyltoluene	98-51-1	10	60	-	10	60	20	120	-	-	-

TABLE Z-1-A. Limits For Air Contaminants

Substance	CAS No.	Transitional Limits		Skin Designation	Final Rule Limits**						Skin Designation
		PEL*			TWA		SIEL ^c		CEILING		
		ppm ^a	mg/m ³ ^b		ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b	
Cadmium fume (as Cd)	7440-43-9	See Table Z-2			In process of 6(b) rulemaking						
Cadmium dust (as Cd)	7440-43-9	See Table Z-2			In process of 6(b) rulemaking						
Calcium carbonate	1317-65-3										
Total dust		-	15	-	-	15	-	-	-	-	-
Respirable fraction		-	5	-	-	5	-	-	-	-	-
Calcium cyanamide	156-62-7	-	-	-	-	0.5	-	-	-	-	-
Calcium hydroxide	1305-62-0	-	-	-	-	5	-	-	-	-	-
Calcium oxide	1305-78-8	-	5	-	-	5	-	-	-	-	-
Calcium silicate	1344-95-2										
Total dust		-	15	-	-	15	-	-	-	-	-
Respirable fraction		-	5	-	-	5	-	-	-	-	-
Calcium sulfate	7778-18-9										
Total dust		-	15	-	-	15	-	-	-	-	-
Respirable fraction		-	5	-	-	5	-	-	-	-	-
Camphor, synthetic	76-22-2	-	2	-	-	2	-	-	-	-	-

TABLE Z-1-A. Limits For Air Contaminants

Substance	CAS No.	Transitional Limits			Skin Designation	Final Rule Limits**						Skin Designation	
		PEL*		b		TWA		STEL ^C		CEILING			b
		ppm ^a	mg/m ³			ppm ^a	mg/m ³	ppm ^a	mg/m ³	ppm ^a	mg/m ³		
Caprolactam	105-60-2												
Dust		-	-	-	-	1	-	3	-	-	-		
Vapor		-	-	-	5	20	10	40	-	-	-		
Captan ^R (Difolatan ^R)	2425-06-1	-	-	-	-	0.1	-	-	-	-	-		
Captan	133-06-2	-	-	-	-	5	-	-	-	-	-		
Carbaryl ^R (Sevin ^R)	63-25-2	-	5	-	-	5	-	-	-	-	-		
Carbofuran ^R (Furadan ^R)	1563-66-2	-	-	-	-	0.1	-	-	-	-	-		
Carbon black	1333-86-4	-	3.5	-	-	3.5	-	-	-	-	-		
Carbon dioxide	124-38-9	5000	9000	-	10,000	18,000	30,000	54,000	-	-	-		
Carbon disulfide	75-15-0		See Table Z-2		4	12	12	36	-	-	X		
Carbon monoxide	630-08-0	50	55	-	35	40	-	-	200	229	-		
Carbon tetrabromide	558-13-4	-	-	-	0.1	1.4	0.3	4	-	-	-		
Carbon tetrachloride	56-23-5		See Table Z-2		2	12.6	-	-	-	-	-		
Carbonyl fluoride	353-50-4	-	-	-	2	5	5	15	-	-	-		
Catechol													
(Pyrocatechol)	120-80-9	-	-	-	5	20	-	-	-	-	X		

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TABLE Z-1-A. Limits For Air Contaminants

Substance	CAS No.	Transitional Limits			Skin Designation	Final Rule Limits**						Skin Designation	
		PEL*		b		TWA		STEL ^c		CEILING			b
		ppm ^a	mg/m ³			ppm ^a	mg/m ³	ppm ^a	mg/m ³	ppm ^a	mg/m ³		
Cellulose	9004-34-6	-	15	-	-	15	-	-	-	-	-	-	
Total dust		-	5	-	-	5	-	-	-	-	-	-	
Respirable fraction		-	-	-	-	2	-	-	-	-	-	-	
Cesium hydroxide	21351-79-1	-	0.5	X	-	0.5	-	-	-	-	X	X	
Chlordane	57-74-9	-	0.5	X	-	0.5	-	1	-	-	X	X	
Chlorinated camphene	8001-35-2	-	0.5	-	-	0.5	-	-	-	-	-	-	
Chlorinated diphenyl oxide	55720-99-5	(C)1	(C)3	-	0.5	1.5	1	3	-	-	-	-	
Chlorine	7782-50-5	0.1	0.3	-	0.1	0.3	0.3	0.9	-	-	-	-	
Chlorine dioxide	10049-04-4	(C)0.1	(C)0.4	-	-	-	-	-	0.1	0.4	-	-	
Chlorine trifluoride	7790-91-2	(C)1	(C)3	-	-	-	-	-	1	3	-	-	
Chloroacetaldehyde	107-20-0	0.05	0.3	-	0.05	0.3	-	-	-	-	-	-	
a-Chloroacetophenone		-	-	-	0.05	0.2	-	-	-	-	-	-	
(Phenacyl chloride)	532-27-4	-	-	-	75	350	-	-	-	-	-	-	
Chloroacetyl chloride	79-04-9	75	350	-	75	350	-	-	-	-	-	-	
Chlorobenzene	108-90-7												

TABLE Z-1-A. Limits For Air Contaminants

Substance	CAS No.	Transitional Limits			Final Rule Limits**					
		PEL*		Skin Designation	TWA		STEL ^c		CEILING	
		ppm ^a	mg/m ³ ^b		ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b
o-Chlorobenzylidene malononitrile	2698-41-1	0.05	0.4	-	-	-	-	-	0.05	0.4
Chlorobromomethane	74-97-5	200	1050	-	200	1050	-	-	-	-
2-Chloro-1,3-butadiene; see b-Chloroprene										
Chlorodifluoromethane	75-45-6	-	-	-	1000	3500	-	-	-	-
Chlorodiphenyl (42% Chlorine) (PCB)	53469-21-9	-	1	X	-	1	-	-	-	-
Chlorodiphenyl (54% Chlorine) (PCB)	11097-69-1	-	0.5	X	-	0.5	-	-	-	-
1-Chloro,2,3-epoxypropane; see Epichlorohydrin										
2-Chloroethanol; see Ethylene chlorohydrin										
Chloroethylene; see Vinyl chloride										

TABLE 2-1-A. Limits For Air Contaminants

Substance	CAS No.	Transitional Limits		Skin Designation	Final Rule Limits **						
		PEL *			TWA		STEL ^c		CEILING		Skin Designation
		ppm ^a	mg/m ³ ^b		ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b	
Chloroform (Trichloromethane)	67-66-3	(C)50	(C)240	-	2	9.78	-	-	-	-	-
bis(Chloromethyl) ether; see 1910.1008	542-88-1										
Chloromethyl methyl ether; see 1910.1006	107-30-2										
1-Chloro-1-nitropropane	600-25-9	20	100	-	2	10	-	-	-	-	-
Chloropentafluoro- ethane	76-15-3	-	-	-	1000	6320	-	-	-	-	-
Chloropicrin	76-06-2	0.1	0.7	-	0.1	0.7	-	-	-	-	-
beta-Chloroprene	126-99-8	25	90	X	10	35	-	-	-	-	X
o-Chlorostyrene	2039-87-4	-	-	-	50	285	75	430	-	-	-
o-Chlorotoluene	95-49-8	-	-	-	50	250	-	-	-	-	-

TABLE Z-1-A. Limits For Air Contaminants

Substance	CAS No.	Transitional Limits			Final Rule Limits**						Skin Designation
		PEL*		Skin Designation	TWA		SIEL ^c		CEILING		
		ppm ^a	mg/m ³ ^b		ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b	
2-Chloro-6-trichloro-methyl pyridine	1929-82-4	-	15	-	-	15	-	-	-	-	-
Total dust		-	5	-	-	5	-	-	-	-	-
Respirable fraction		-	-	-	-	0.2	-	-	-	-	X
Chlorpyrifos	2921-88-2	-	-	-	-	-	-	-	-	-	-
Chromic acid and chromates (as CrO ₃)	Varies with compound	-	See Table Z-2	-	-	-	-	-	0.1	-	-
Chromium (II) compounds (as Cr)	Varies with compound	-	0.5	-	-	0.5	-	-	-	-	-
Chromium (III) compounds (as Cr)	Varies with compound	-	0.5	-	-	0.5	-	-	-	-	-
Chromium metal (as Cr)	7440-47-3	-	1	-	-	1	-	-	-	-	-

TABLE Z-1-A. Limits For Air Contaminants

Substance	CAS No.	Transitional Limits			Skin Designation	Final Rule Limits**					
		PEL [*]		TWA		STEL ^c		CEILING		Skin Designation	
		ppm ^a	mg/m ³ ^b			ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b		
Chrysene; see Coal tar pitch volatiles	218-01-9										
Clopidol	2971-90-6										
Total dust		-	15	-	-	15	-	-	-	-	-
Respirable fraction		-	5	-	-	5	-	-	-	-	-
Coal dust (less than 5% SiO ₂), Respirable quartz fraction	—		See Table Z-3			2	-	-	-	-	-
Coal dust (greater than or equal to 5% SiO ₂), Respirable quartz fraction	—		See Table Z-3			0.1	-	-	-	-	-

TABLE Z-1-A. Limits For Air Contaminants

Substance	CAS No.	Transitional Limit		Skin Designation	Final Rule Limits**						Skin Designation
		PEL*			TWA	STEL ^c		CEILING			
		ppm ^a	mg/m ³ ^b			ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b		
Coal tar pitch volatiles (benzene soluble fraction), anthracene, BaP, phenanthrene, acridine, chrysene, pyrene	8007-45-2	-	0.2	-	-	0.2	-	-	-	-	-
Cobalt metal, dust, and fume (as Co)	7440-48-4	-	0.1	-	-	0.05	-	-	-	-	-
Cobalt carbonyl (as Co)	10210-68-1	-	-	-	-	0.1	-	-	-	-	-
Cobalt hydrocarbonyl (as Co)	16842-03-8	-	-	-	-	0.1	-	-	-	-	-
Coke oven emissions; see 1910.1029	--										
Copper	7440-50-8										
Fume (as Cu)		-	0.1	-	-	0.1	-	-	-	-	-
Dusts and mists (as Cu)		-	1	-	-	1	-	-	-	-	-

TABLE Z-1-A. Limits For Air Contaminants

Substance	CAS No.	Transitional Limits			Skin Designation	Final Rule Limits**						Skin Designation
		PEL*		TWA		STEL ^c		CEILING				
		ppm ^a	mg/m ³ ^b			ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b			
Cotton dust (raw),	—	1	—	—	1	—	—	—	—	—	—	
This 8-hour TWA applies to respirable dust as measured by a vertical elutriator cotton dust sampler or equivalent instrument. The time-weighted average applies to the cotton waste processing operations of waste recycling (sorting, blending, cleaning, and willowing) and garretting. See also 1910.1043 for cotton dust limits applicable to other sectors.												
Crag herbicide (Sesone)	136-78-7	—	15	—	—	10	—	—	—	—	—	
Total dust		—	5	—	—	5	—	—	—	—	—	
Respirable fraction		—	—	—	—	—	—	—	—	—	—	
Cresol, all isomers	1319-77-3;	5	22	X	5	22	—	—	—	—	X	
	95-48-7;											
	108-39-4;											
	106-44-5											
Crotonaldehyde	123-73-9;	2	6	—	2	6	—	—	—	—	—	
	4170-30-3											
Cruformate	299-86-5	—	—	—	—	5	—	—	—	—	—	
Cumene	98-82-8	50	245	X	50	245	—	—	—	—	X	
Cyanamide	420-04-2	—	—	—	—	2	—	—	—	—	—	

TABLE Z-1-A. Limits For Air Contaminants

Substance	CAS No.	Transitional Limits		Skin Designation	Final Rule Limits**						Skin Designation	
		PEL*			TWA		STEL ^c		CEILING			
		ppm ^a	mg/m ³ ^b		ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b		
Cyanides (as CN)	151-50-8	-	5	-	-	5	-	-	-	-	-	-
Cyanogen	460-19-5	-	-	-	10	20	-	-	-	-	-	-
Cyanogen chloride	506-77-4	-	-	-	-	-	-	-	0.3	0.6	-	-
Cyclohexane	110-82-7	300	1050	-	300	1050	-	-	-	-	-	-
Cyclohexanol	108-93-0	50	200	-	50	200	-	-	-	-	-	X
Cyclohexanone	108-94-1	50	200	-	25	100	-	-	-	-	-	X
Cyclohexene	110-83-8	300	1015	-	300	1015	-	-	-	-	-	-
Cyclohexylamine	108-91-8	-	-	-	10	40	-	-	-	-	-	-
Cyclonite	121-82-4	-	-	-	-	1.5	-	-	-	-	-	X
Cyclopentadiene	542-92-7	75	200	-	75	200	-	-	-	-	-	-
Cyclopentane	287-92-3	-	-	-	600	1720	-	-	-	-	-	-
Cyhexatin	13121-70-5	-	-	-	-	5	-	-	-	-	-	-
2,4-D (Dichlorophenoxy- acetic acid)	94-75-7	-	10	-	-	10	-	-	-	-	-	-
Decaborane	17702-41-9	0.05	0.3	X	0.05	0.3	0.15	0.9	-	-	-	X
Demeton (Systox ^R)	8065-48-3	-	0.1	X	-	0.1	-	-	-	-	-	X
Dichlorodiphenyltri- chloroethane (DDT)	50-29-3	-	1	X	-	1	-	-	-	-	-	X

TABLE Z-1-A. Limits For Air Contaminants

Substance	CAS No.	Transitional Limits		Skin Designation	Final Rule Limits**						
		PEL ^a			TWA		STEL ^c		CEILING		Skin Designation
		ppm ^a	mg/m ³ ^b		ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b	
Dichlorvos (DDVP)	62-73-7	-	1	X	-	1	-	-	-	-	X
Diacetone alcohol (4-Hydroxy-4-methyl- 2-pentanone)	123-42-2	50	240	-	50	240	-	-	-	-	-
1,2-Diaminoethane; see Ethylenediamine											
Diazinon	333-41-5	-	-	-	-	0.1	-	-	-	-	X
Diazomethane	334-88-3	0.2	0.4	-	0.2	0.4	-	-	-	-	-
Diborane	19287-45-7	0.1	0.1	-	0.1	0.1	-	-	-	-	-
1,2-Dibromo- 3-chloropropane; see 1910.1044	96-12-8										
2-N-Dibutylamino- ethanol	102-81-8	-	-	-	2	14	-	-	-	-	-
Dibutyl phosphate	107-66-4	1	5	-	1	5	2	10	-	-	-

TABLE Z-1-A. Limits For Air Contaminants

Substance	CAS No.	Transitional Limits			Skin Designation	Final Rule Limits**						Skin Designation
		PEL*		TWA		STEL ^c		CEILING				
		ppm ^a	mg/m ³ ^b			ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b			
Dibutyl phthalate	84-74-2	-	5	-	-	5	-	-	-	-	-	-
Dichloroacetylene	7572-29-4	-	-	-	-	-	-	-	0.1	0.4	-	-
o-Dichlorobenzene	95-50-1	(C)50	(C)300	-	-	-	-	-	50	300	-	-
p-Dichlorobenzene	106-46-7	75	450	-	75	450	110	675	-	-	-	-
3,3'-Dichlorobenzidine; see 1910.1007	91-94-1											
Dichlorodifluoro- methane	75-71-8	1000	4950	-	1000	4950	-	-	-	-	-	-
1,3-Dichloro-5,5- dimethyl hydantoin	118-52-5	-	0.2	-	-	0.2	-	0.4	-	-	-	-
1,1-Dichloroethane	75-34-3	100	400	-	100	400	-	-	-	-	-	-
1,2-Dichloroethylene	540-59-0	200	790	-	200	790	-	-	-	-	-	-
Dichloroethyl ether	111-44-4	(C)15	(C)90	X	5	30	10	60	-	-	-	X
Dichloromethane; see Methylene chloride												

TABLE Z-1-A. Limits For Air Contaminants

Substance	CAS No.	Transitional Limits		Skin Designation	Final Rule Limits**						
		* PEL			TWA		STEL ^c		CEILING		Skin Designation
		ppm ^a	mg/m ³ ^b		ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b	
Dichloromonofluoromethane	75-43-4	1000	4200	-	10	40	-	-	-	-	-
1,1-Dichloro-1-nitroethane	594-72-9	(C)10	(C)60	-	2	10	-	-	-	-	-
1,2-Dichloropropane; see Propylene dichloride											
1,3-Dichloropropene	542-75-6	-	-	-	1	5	-	-	-	-	X
2,2-Dichloropropionic acid	75-99-0	-	-	-	1	6	-	-	-	-	-
Dichlorotetrafluoroethane	76-14-2	1000	7000	-	1000	7000	-	-	-	-	-
Dicrotophos	141-66-2	-	-	-	-	0.25	-	-	-	-	X
Dicyclopentadiene	77-73-6	-	-	-	5	30	-	-	-	-	-
Dicyclopentadienyl iron	102-54-5										
Total dust		-	15	-	-	10	-	-	-	-	-
Respirable fraction		-	5	-	-	5	-	-	-	-	-

TABLE Z-1-A. Limits For Air Contaminants

Substance	CAS No.	Transitional Limits		Skin Designation	Final Rule Limits**						
		PEL ^a			TWA		STEL ^c		CEILING		Skin Designation
		ppm ^a	mg/m ³ ^b		ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b	
Dieldrin	60-57-1	-	0.25	X	-	0.25	-	-	-	-	X
Diethanolamine	111-42-2	-	-	-	3	15	-	-	-	-	-
Diethylamine	109-89-7	25	75	-	10	30	25	75	-	-	-
2-Diethylaminoethanol	100-37-8	10	50	X	10	50	-	-	-	-	X
Diethylene triamine	111-40-0	-	-	-	1	4	-	-	-	-	-
Diethyl ether; see Ethyl ether											
Diethyl ketone	96-22-0	-	-	-	200	705	-	-	-	-	-
Diethyl phthalate	84-66-2	-	-	-	-	5	-	-	-	-	-
Difluorodibromomethane	75-61-6	100	860	-	100	860	-	-	-	-	-
Diglycidyl ether (DGE)	2238-07-5	(C)0.5	(C)2.8	-	0.1	0.5	-	-	-	-	-
Dihydroxybenzene; see Hydroquinone											
Diisobutyl ketone	108-83-8	50	290	-	25	150	-	-	-	-	-

TABLE Z-1-A. Limits For Air Contaminants

Substance	CAS No.	Transitional Limits		Skin Designation	Final Rule Limits**						Skin Designation
		PEL*			TWA		STEL ^c		CEILING		
		ppm ^a	mg/m ³ ^b		ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b	
Diisopropylamine	108-18-9	5	20	X	5	20	-	-	-	-	X
4-Dimethylaminoazobenzene; see 1910.1015	60-11-7										
Dimethoxymethane; see Methylal											
Dimethyl acetamide	127-19-5	10	35	X	10	35	-	-	-	-	X
Dimethylamine	124-40-3	10	18	-	10	18	-	-	-	-	-
Dimethylaminobenzene; see Xylidine											
Dimethylaniline (N-Dimethyl-aniline)	121-69-7	5	25	X	5	25	10	50	-	-	X
Dimethylbenzene; see Xylene											
Dimethyl-1,2-dibromo- 2,2-dichloroethyl phosphate	300-76-5	-	3	-	-	3	-	-	-	-	X

TABLE 2-1-A. Limits For Air Contaminants

Substance	CAS No.	Transitional Limits			Skin Designation	Final Rule Limits**					
		PEL*		TWA		STEL ^c		CEILING		Skin Designation	
		ppm ^a	mg/m ³ ^b			ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b		
Dimethylformamide	68-12-2	10	30	X	10	30	-	-	-	-	X
2,6-Dimethyl-4-heptanone; see Diisobutyl ketone											
1,1-Dimethylhydrazine	57-14-7	0.5	1	X	0.5	1	-	-	-	-	X
Dimethylphthalate	131-11-3	-	5	-	-	5	-	-	-	-	-
Dimethyl sulfate	77-78-1	1	5	X	0.1	0.5	-	-	-	-	X
Dinitolmide (3,5-Dinitro-o-toluidide)	148-01-6	-	-	-	-	5	-	-	-	-	-
Dinitrobenzene (all isomers)	528-29-0 99-65-0 100-25-4	-	1	X	-	1	-	-	-	-	X
Dinitro-o-cresol	534-52-1	-	0.2	X	-	0.2	-	-	-	-	X
Dinitrotoluene	121-14-2	-	1.5	X	-	1.5	-	-	-	-	X
Dioxane (Diethylene dioxide)	123-91-1	100	360	X	25	90	-	-	-	-	X

TABLE Z-1-A. Limits For Air Contaminants

Substance	CAS No.	Transitional Limits			Final Rule Limits**						Skin Designation
		PEL*		Skin Designation	TWA		STEL ^c		CEILING		
		ppm ^a	mg/m ³ ^b		ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b	
Dioxathion (DeInav)	78-34-2	-	-	-	-	0.2	-	-	-	-	X
Diphenyl (Biphenyl)	92-52-4	0.2	1	-	0.2	1	-	-	-	-	-
Diphenylamine	122-39-4	-	-	-	-	10	-	-	-	-	-
Diphenylmethane diisocyanate; see Methylene bisphenyl isocyanate											
Dipropylene glycol methyl ether	34590-94-8	100	600	X	100	600	150	900	-	-	X
Dipropyl ketone	123-19-3	-	-	-	50	235	-	-	-	-	-
Diquat	85-00-7	-	-	-	-	0.5	-	-	-	-	-
Di-sec octyl phthalate (Di-2-ethylhexyl-phthalate)	117-81-7	-	5	-	-	5	-	10	-	-	-
Disulfiram	97-77-8	-	-	-	-	2	-	-	-	-	-
Disulfoton	298-04-4	-	-	-	-	0.1	-	-	-	-	X

TABLE Z-1-A. Limits For Air Contaminants

Substance	CAS No.	Transitional Limits		Skin Designation	Final Rule Limits**						
		PEL*			TWA		STEL ^C		CEILING		Skin Designation
		ppm ^a	mg/m ³ ^b		ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b	
2,6-Di-tert-butyl-p-cresol	128-37-0	-	-	-	-	10	-	-	-	-	-
Diuron	330-54-1	-	-	-	-	10	-	-	-	-	-
Divinyl benzene	108-57-6	-	-	-	10	50	-	-	-	-	-
Emery	112-62-9	-	-	-	-	-	-	-	-	-	-
Total dust		-	15	-	-	10	-	-	-	-	-
Respirable fraction		-	5	-	-	5	-	-	-	-	-
Endosulfan	115-29-7	-	-	-	-	0.1	-	-	-	-	X
Endrin	72-20-8	-	0.1	X	-	0.1	-	-	-	-	X
Epichlorohydrin	106-89-8	5	19	X	2	8	-	-	-	-	X
EPN	2104-64-5	-	0.5	X	-	0.5	-	-	-	-	X
1,2-Epoxypropane; see Propylene oxide											
2,3-Epoxy-1-propanol; see Glycidol											

TABLE Z-1-A. Limits For Air Contaminants

Substance	CAS No.	Transitional Limits			Skin Designation	Final Rule Limits**					
		PEL*		TWA		STEL ^c		CEILING		Skin Designation	
		ppm ^a	mg/m ³ ^b			ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b		
Ethanethiol; see Ethyl mercaptan											
Ethanolamine	141-43-5	3	6	-	3	8	6	15	-	-	-
Ethion	563-12-2	-	-	-	-	0.4	-	-	-	-	X
2-Ethoxyethanol	110-80-5	200	740	X	In process of 6(b) rulemaking						
2-Ethoxyethyl acetate (Cellosolve acetate)	111-15-9	100	540	X	In process of 6(b) rulemaking						
Ethyl acetate	141-78-6	400	1400	-	400	1400	-	-	-	-	-
Ethyl acrylate	140-88-5	25	100	X	5	20	25	100	-	-	X
Ethyl alcohol (Ethanol)	64-17-5	1000	1900	-	1000	1900	-	-	-	-	-
Ethylamine	75-04-7	10	18	-	10	18	-	-	-	-	-
Ethyl amyl ketone (5-Methyl-3-heptanone)	106-68-3	25	130	-	25	130	-	-	-	-	-
Ethyl benzene	100-41-4	100	435	-	100	435	125	545	-	-	-
Ethyl bromide	74-96-4	200	890	-	200	890	250	1110	-	-	-

TABLE Z-1-A. Limits For Air Contaminants

Substance	CAS No.	Transitional Limits		Skin Designation	Final Rule Limits**						Skin Designation
		PEL*			TWA		STEL ^c		CEILING		
		ppm ^a	mg/m ³ ^b		ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b	
Ethyl butyl ketone (3-Heptanone)	106-35-4	50	230	-	50	230	-	-	-	-	-
Ethyl chloride	75-00-3	1000	2600	-	1000	2600	-	-	-	-	-
Ethyl ether	60-29-7	400	1200	-	400	1200	500	1500	-	-	-
Ethyl formate	109-94-4	100	300	-	100	300	-	-	-	-	-
Ethyl mercaptan	75-08-1	(C)10	(C)25	-	0.5	1	-	-	-	-	-
Ethyl silicate	78-10-4	100	850	-	10	85	-	-	-	-	-
Ethylene chlorohydrin	107-07-3	5	16	X	-	-	-	-	1	3	X
Ethylenediamine	107-15-3	10	25	-	10	25	-	-	-	-	-
Ethylene dibromide	106-93-4	See Table Z-2		-	In process of 6(b) rulemaking						-
Ethylene dichloride	107-06-2	See Table Z-2		-	1	4	2	8	-	-	-
Ethylene glycol	107-21-1	-	-	-	-	-	-	-	50	125	-
Ethylene glycol dinitrate	628-96-6	(C)0.2	(C)1	X	-	-	-	0.1	-	-	X

TABLE Z-1-A. Limits For Air Contaminants

Substance	CAS No.	Transitional Limits			Final Rule Limits**						Skin Designation
		PEL ^a		Skin Designation	TWA		STEL ^c		CEILING		
		ppm ^a	mg/m ³ ^b		ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b	
Ethylene glycol methyl acetate; see Methyl cellosolve acetate											
Ethyleneimine; see 1910.1012	151-56-4										
Ethylene oxide; see 1910.1047	75-21-8				See 1910.1047(a)(2) for operations excluded						
Ethylidene chloride; see 1,1-Dichloroethane											
Ethylidene norbornene	16219-75-3	-	-	-	-	-	-	-	5	25	-
N-Ethylmorpholine	100-74-3	20	94	X	5	23	-	-	-	-	X
Fenamiphos	22224-92-6	-	-	-	-	0.1	-	-	-	-	X
Fensulfothion (Dasanit)	115-90-2	-	-	-	-	0.1	-	-	-	-	-
Fenthion	55-38-9	-	-	-	-	0.2	-	-	-	-	X

TABLE Z-1-A. Limits For Air Contaminants

Substance	CAS No.	Transitional Limits			Skin Designation	Final Rule Limits**						Skin Designation
		PEL*		TWA		STEL ^C		CEILING				
		ppm ^a	mg/m ³ ^b			ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b			
Ferban	14484-64-1											
Total dust		-	15	-	-	10	-	-	-	-	-	-
Respirable fraction		-	5	-	-	5	-	-	-	-	-	-
Ferrovandium dust	12604-58-9	-	1	-	-	1	-	3	-	-	-	-
Fluorides (as F)	Varies with compound	See Table Z-2			2.5	-	-	-	-	-	-	-
Fluorine	7782-41-4	0.1	0.2	-	0.1	0.2	-	-	-	-	-	-
Fluorotrichloromethane (Trichlorofluoromethane)	75-69-4	1000	5600	-	-	-	-	-	1000	5600	-	-
Fonofos	944-22-9	-	-	-	-	0.1	-	-	-	-	-	X
Formaldehyde; see 1910.1048;	50-00-0	See Table Z-2 for operations or sectors excluded or for which limit(s) is(are) stayed.										
Formamide	75-12-7	-	-	-	20	30	30	45	-	-	-	-
Formic acid	64-18-6	5	9	-	5	9	-	-	-	-	-	-
Furfural	98-01-1	5	20	X	2	8	-	-	-	-	-	X

TABLE Z-1-A. Limits For Air Contaminants

Substance	CAS No.	Transitional Limits			Final Rule Limits**						Skin Designation
		PEL*		Skin Designation	TWA		STEL ^C		CEILING		
		ppm ^a	mg/m ³ ^b		ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b	
Furfuryl alcohol	98-00-0	50	200	-	10	40	15	60	-	-	X
Gasoline	8006-61-9	-	-	-	300	900	500	1500	-	-	-
Germanium tetrahydride	7782-65-2	-	-	-	0.2	0.6	-	-	-	-	-
Glutaraldehyde	111-30-8	-	-	-	-	-	-	-	0.2	0.8	-
Glycerin (mist)	56-81-5	-	-	-	-	-	-	-	-	-	-
Total dust		-	15	-	-	10	-	-	-	-	-
Respirable fraction		-	5	-	-	5	-	-	-	-	-
Glycidol	556-52-5	50	150	-	25	75	-	-	-	-	-
Glycol monoethyl ether; see 2-Ethoxyethanol		-	-	-	-	-	-	-	-	-	-
Grain dust (oat, wheat, barley)	-	-	-	-	-	10	-	-	-	-	-
Graphite, natural respirable dust	7782-42-5	See Table 2-3			-	2.5	-	-	-	-	-

TABLE Z-1-A. Limits For Air Contaminants

Substance	CAS No.	Transitional Limits			Final Rule Limits**						Skin Designation
		PEL*		Skin Designation	TWA		STEL ^c		CEILING		
		ppm ^a	mg/m ³ ^b		ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b	
Graphite, synthetic	—										
Total dust		—	15	—	—	10	—	—	—	—	—
Respirable fraction		—	5	—	—	5	—	—	—	—	—
Guthion ^R ; see Azinphos methyl											
Gypsum	7778-18-9										
Total dust		—	15	—	—	15	—	—	—	—	—
Respirable fraction		—	5	—	—	5	—	—	—	—	—
Hafnium	7440-58-6	—	0.5	—	—	0.5	—	—	—	—	—
Heptachlor	76-44-8	—	0.5	X	—	0.5	—	—	—	—	X
Heptane (n-Heptane)	142-92-5	500	2000	—	400	1600	500	2000	—	—	—
Hexachlorobutadiene	87-68-3	—	—	—	0.02	0.24	—	—	—	—	—
Hexachlorocyclopentadiene	77-47-4	—	—	—	0.01	0.1	—	—	—	—	—
Hexachloroethane	67-72-1	1	10	X	1	10	—	—	—	—	X
Hexachloronaphthalene	1335-87-1	—	0.2	X	—	0.2	—	—	—	—	X

TABLE Z-1-A. Limits For Air Contaminants

Substance	CAS No.	Transitional Limits		Skin Designation	Final Rule Limits**						
		PEL*			TWA		STEL ^C		CELLING		Skin Designation
		ppm ^a	mg/m ³ ^b		ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b	
Hexafluoroacetone	684-16-2	-	-	-	0.1	0.7	-	-	-	-	X
n-Hexane	110-54-3	500	1800	-	50	180	-	-	-	-	-
Hexane isomers	Varies with compound	-	-	-	500	1800	1000	3600	-	-	-
2-Hexanone (Methyl n-butyl ketone)	591-78-6	100	410	-	5	20	-	-	-	-	-
Hexone (Methyl isobutyl ketone)	108-10-1	100	410	-	50	205	75	300	-	-	-
sec-Hexyl acetate	108-84-9	50	300	-	50	300	-	-	-	-	-
Hexylene glycol	107-41-5	-	-	-	-	-	-	-	25	125	-
Hydrazine	302-01-2	1	1.3	X	0.1	0.1	-	-	-	-	X
Hydrogenated terphenyls	61788-32-7	-	-	-	0.5	5	-	-	-	-	-
Hydrogen bromide	10035-10-6	3	10	-	-	-	-	-	3	10	-
Hydrogen chloride	7647-01-0	(C)5	(C)7	-	-	-	-	-	5	7	-

TABLE Z-1-A. Limits For Air Contaminants

Substance	CAS No.	Transitional Limits		Skin Designation	Final Rule Limits**						Skin Designation
		PEL*			TWA		STEL ^C		CEILING		
		ppm ^a	mg/m ³ ^b		ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b	
Hydrogen cyanide	74-90-8	10	11	X	-	-	4.7	5	-	-	X
Hydrogen fluoride (as F)	7664-39-3	See Table Z-2		-	3	-	6	-	-	-	-
Hydrogen peroxide	7722-84-1	1	1.4	-	1	1.4	-	-	-	-	-
Hydrogen selenide (as Se)	7783-07-5	0.05	0.2	-	0.05	0.2	-	-	-	-	-
Hydrogen sulfide	7783-06-4	See Table Z-2		-	10	14	15	21	-	-	-
Hydroquinone	123-31-9	-	2	-	-	2	-	-	-	-	-
2-Hydroxypropyl acrylate	999-61-1	-	-	-	0.5	3	-	-	-	-	X
Indene	95-13-6	-	-	-	10	45	-	-	-	-	-
Indium and compounds (as In)	7440-74-6	-	-	-	-	0.1	-	-	-	-	-
Iodine	7553-56-2	(C)0.1	(C)1	-	-	-	-	-	0.1	1	-
Iodoform	75-47-8	-	-	-	0.6	10	-	-	-	-	-

TABLE Z-1-A. Limits For Air Contaminants

TABLE 2-1-A. Limits for Iron Salts											
Substance	CAS No.	Transitional Limits		Skin Designation	Final Rule Limits**						
		PEL*			TWA		STEL ^c		CEILING		Skin Designation
		ppm ^a	mg/m ³ ^b		ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b	
Iron oxide dust and fume (as Fe)	1309-37-1	-	10	-	-	10	-	-	-	-	
Total particulate		-	-	-	0.1	0.8	0.2	1.6	-	-	
Iron pentacarbonyl (as Fe)	13463-40-6	-	-	-	-	-	-	-	-	-	
Iron salts (soluble) (as Fe)	Varies with compound	-	-	-	-	1	-	-	-	-	
Isoamyl acetate	123-92-2	100	525	-	100	525	-	-	-	-	
Isoamyl alcohol (primary and secondary)	123-51-3	100	360	-	100	360	125	450	-	-	
Isobutyl acetate	110-19-0	150	700	-	150	700	-	-	-	-	
Isobutyl alcohol	78-83-1	100	300	-	50	150	-	-	-	-	
Isopentyl alcohol	26952-21-6	-	-	-	50	270	-	-	-	X	
Isophorone	78-59-1	25	140	-	4	23	-	-	-	-	
Isophorone diisocyanate	4098-71-9	-	-	-	0.005	-	0.02	-	-	X	

TABLE Z-1-A. Limits for Air Contaminants

Substance	CAS No.	Transitional Limits		Skin Designation	Final Rule Limits**						Skin Designation
		PEL*			TWA		STEL ^C		CEILING		
		ppm ^a	mg/m ³ ^b		ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b	
2-Isopropoxyethanol	109-59-1	-	-	-	25	105	-	-	-	-	-
Isopropyl acetate	108-21-4	250	950	-	250	950	310	1185	-	-	-
Isopropyl alcohol	67-63-0	400	980	-	400	980	500	1225	-	-	-
Isopropylamine	75-31-0	5	12	-	5	12	10	24	-	-	-
N-Isopropylaniline	768-52-5	-	-	-	2	10	-	-	-	-	X
Isopropyl ether	108-20-3	500	2100	-	500	2100	-	-	-	-	-
Isopropyl glycidyl ether (IGE)	4016-14-2	50	240	-	50	240	75	360	-	-	-
Kaolin	-	-	-	-	-	-	-	-	-	-	-
Total dust		-	15	-	-	10	-	-	-	-	-
Respirable fraction		-	5	-	-	5	-	-	-	-	-
Ketene	463-51-4	0.5	0.9	-	0.5	0.9	1.5	3	-	-	-
Lead inorganic (as Pb); see 1910.1025	7439-92-1	For independent battery breaking, non-ferrous foundries, secondary copper, lead pigments, lead chemical, ship building, stevedoring, and brass and bronze ingot manufacturing, paragraph (e)(1) is under court remand									

TABLE Z-1-A. Limits For Air Contaminants

TABLE 2-1-A. Limits for Air Contaminants											
Substance	CAS No.	Transitional Limits			Final Rule Limits**						
		PEL*		Skin Designation	TWA		STEL ^c		CEILING		Skin Designation
		ppm ^a	mg/m ³ ^b		ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b	
Limestone	1317-67-3	-	15	-	-	15	-	-	-	-	-
Total dust		-	5	-	-	5	-	-	-	-	-
Respirable fraction		-	0.5	X	-	0.5	-	-	-	-	X
Lindane	58-89-9	-	0.025	-	-	0.025	-	-	-	-	-
Lithium hydride	7580-67-8	-	0.025	-	-	0.025	-	-	-	-	-
L.P.G. (Liquefied petroleum gas)	68476-85-7	1000	1800	-	1000	1800	-	-	-	-	-
Magnesite	546-93-0	-	15	-	-	15	-	-	-	-	-
Total dust		-	5	-	-	5	-	-	-	-	-
Respirable fraction		-	0.5	-	-	0.5	-	-	-	-	-
Magnesium oxide fume	1309-48-4	-	15	-	-	10	-	-	-	-	-
Total dust		-	5	-	-	5	-	-	-	-	-
Respirable fraction		-	0.5	-	-	0.5	-	-	-	-	-
Malathion	121-75-5	-	15	X	-	10	-	-	-	-	X
Total dust		-	5	X	-	5	-	-	-	-	X
Respirable fraction		-	0.5	-	-	0.5	-	-	-	-	-
Maleic anhydride	108-31-6	0.25	1	-	0.25	1	-	-	-	-	-

TABLE Z-1-A. Limits For Air Contaminants

Substance	CAS No.	Transitional Limits		Skin Designation	Final Rule Limits**						
		PEL*			TWA		STEL ^c		CEILING		Skin Designation
		ppm ^a	mg/m ³ ^b		ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b	
Manganese compounds											
(as Mn)	7439-96-5	-	(C)5	-	-	-	-	-	-	5	-
Manganese fume											
(as Mn)	7439-96-5	-	(C)5	-	-	1	-	3	-	-	-
Manganese cyclopentadienyl tricarbonyl											
(as Mn)	12079-65-1	-	-	-	-	0.1	-	-	-	-	X
Manganese tetroxide											
(as Mn)	1317-35-7	-	-	-	-	1	-	-	-	-	-
Marble	1317-65-3										
Total dust		-	15	-	-	15	-	-	-	-	-
Respirable fraction		-	5	-	-	5	-	-	-	-	-
Mercury (aryl and inorganic)(as Hg)	7439-97-6	See Table Z-2		-	-	-	-	-	-	0.1	X
Mercury (organoalkyl compounds (as Hg)	7439-97-6	See Table Z-2		-	-	0.01	-	0.03	-	-	X
Mercury (vapor) (as Hg)	7439-97-6	See Table Z-2		-	-	0.05	-	-	-	-	X

TABLE Z-1-A. Limits For Air Contaminants

TABLE 2-1-A. Limits For Air Contaminants											
Substance	CAS No.	Transitional Limits		Skin Designation	Final Rule Limits**						Skin Designation
		* PEL			TWA		STEL ^c		CEILING		
		ppm ^a	mg/m ³ ^b		ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b	
Mesityl oxide	141-79-7	25	100	-	15	60	25	100	-	-	-
Methacrylic acid	79-41-4	-	-	-	20	70	-	-	-	-	X
Methanethiol; see Methyl mercaptan											
Methomyl (Lannate)	16752-77-5	-	-	-	-	2.5	-	-	-	-	-
Methoxychlor	72-43-5	-	15	-	-	10	-	-	-	-	-
Total dust		-	5	-	-	5	-	-	-	-	-
Respirable fraction											
2-Methoxyethanol; see Methyl cellosolve											
4-Methoxyphenol	150-76-5	-	-	-	-	5	-	-	-	-	-
Methyl acetate	79-20-9	200	610	-	200	610	250	760	-	-	-
Methyl acetylene (Propyne)	74-99-7	1000	1650	-	1000	1650	-	-	-	-	-
Methyl acetylene-propadiene mixture (MAPP)											
		1000	1800	-	1000	1800	1250	2250	-	-	-

TABLE Z-1-A. Limits For Air Contaminants

Substance	CAS No.	Transitional Limits		Skin Designation	Final Rule Limits**						
		PEL*			TWA		STEL ^C		CEILING		
		ppm ^a	mg/m ³ ^b		ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b	
Methyl acrylate	96-33-3	10	35	X	10	35	-	-	-	-	X
Methylacrylonitrile	126-98-7	-	-	-	1	3	-	-	-	-	X
Methylal (Dimethoxymethane)	109-87-5	1000	3100	-	1000	3100	-	-	-	-	-
Methyl alcohol	67-56-1	200	260	-	200	260	250	310	-	-	X
Methylamine	74-89-5	10	12	-	10	12	-	-	-	-	-
Methyl amyl alcohol; see Methyl isobutyl carbinol											
Methyl n-amyl ketone	110-43-0	100	465	-	100	465	-	-	-	-	-
Methyl bromide	74-83-9	(C)20	(C)80	X	5	20	-	-	-	-	X
Methyl butyl ketone; see 2-Hexanone											
Methyl cellosolve (2-Methoxyethanol)	109-86-4	25	80	X	In process of 6(b) rulemaking						

TABLE Z-1-A. Limits For Air Contaminants

Substance	CAS No.	Transitional Limits			Skin Designation	Final Rule Limits**					
		PEL*		TWA		STEL ^c		CEILING		Skin Designation	
		ppm ^a	mg/m ³ ^b			ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b		
Methyl cellosolve acetate (2-Methoxyethyl acetate)	110-49-6	25	120	X	In process of 6(b) rulemaking						
Methyl chloride	74-87-3	See Table Z-2			50	105	100	205	-	-	-
Methyl chloroform (1,1,1-Trichloroethane)	71-55-6	350	1900	-	350	1900	450	2450	-	-	-
Methyl 2-cyanoacrylate	137-05-3	-	-	-	2	8	4	16	-	-	-
Methylcyclohexane	108-87-2	500	2000	-	400	1600	-	-	-	-	-
Methylcyclohexanol	25639-42-3	100	470	-	50	235	-	-	-	-	-
o-Methylcyclohexanone	583-60-8	100	460	X	50	230	75	345	-	-	X
Methylcyclopentadienyl manganese tricarbonyl (as Mn)	12108-13-3	-	-	-	-	0.2	-	-	-	-	X
Methyl demeton	8022-00-2	-	-	-	-	0.5	-	-	-	-	X

TABLE Z-1-A. Limits For Air Contaminants

Substance	CAS No.	Transitional Limits			Final Rule Limits**					
		PEL*		Skin Designation	TWA		STEL ^c		CEILING	
		ppm ^a	mg/m ³ ^b		ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b
4,4'-Methylene bis (2-chloroaniline) (MBOCA)	101-14-4	-	-	-	0.02	0.22	-	-	-	-
Methylene bis(4-cyclo- hexylisocyanate)	5124-30-1	-	-	-	-	-	-	-	0.01	0.11
Methylene chloride	75-09-2	See Table Z-2			In process of 6(b) rulemaking					
Methyl ethyl ketone (MEK); see 2-Butanone										
Methyl ethyl ketone peroxide (MEKP)	1338-23-4	-	-	-	-	-	-	-	0.7	5
Methyl formate	107-31-3	100	250	-	100	250	150	375	-	-
Methyl hydrazine (Mono- methyl hydrazine)	60-34-4	(C)0.2	(C)0.35	X	-	-	-	-	0.2	0.35
Methyl iodide	74-88-4	5	28	X	2	10	-	-	-	-
Methyl isoamyl ketone	110-12-3	-	-	-	50	240	-	-	-	-

TABLE Z-1-A. Limits For Air Contaminants

Substance	CAS No.	Transitional Limits		Skin Designation	Final Rule Limits**						Skin Designation
		PEL*			TWA		STEL ^c		CEILING		
		ppm ^a	mg/m ³ ^b		ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b	
Methyl isobutyl carbinol	108-11-2	25	100	X	25	100	40	165	-	-	X
Methyl isobutyl ketone; see Hexone											
Methyl isocyanate	624-83-9	0.02	0.05	X	0.02	0.05	-	-	-	-	X
Methyl isopropyl ketone	563-80-4	-	-	-	200	705	-	-	-	-	-
Methyl mercaptan	74-93-1	(C)10	(C)20	-	0.5	1	-	-	-	-	-
Methyl methacrylate	80-62-6	100	410	-	100	410	-	-	-	-	-
Methyl parathion	298-00-0	-	-	-	-	0.2	-	-	-	-	X
Methyl propyl ketone; see 2-Pentanone											
Methyl silicate	681-84-5	-	-	-	1	6	-	-	-	-	-
alpha-Methyl styrene	98-83-9	(C)100	(C)480	-	50	240	100	485	-	-	-
Methylene bisphenyl isocyanate (MDI)	101-68-8	(C)0.02	(C)0.2	-	-	-	-	-	0.02	0.2	-

TABLE Z-1-A. Limits For Air Contaminants

Substance	CAS No.	Transitional Limits			Final Rule Limits**						Skin Designation
		PEL*		Skin Designation	TWA		STEL ^c		CEILING		
		ppm ^a	mg/m ³ ^b		ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b	
Metribuzin	21087-64-9	-	-	-	-	5	-	-	-	-	-
Mica; see Silicates											
Molybdenum (as Mo)	7439-98-7										
Soluble compounds		-	5	-	-	5	-	-	-	-	-
Insoluble compounds											
Total dust		-	15	-	-	10	-	-	-	-	-
Respirable fraction		-	5	-	-	5	-	-	-	-	-
Monocrotophos (Azodrin ^R)	6923-22-4	-	-	-	-	0.25	-	-	-	-	-
Monomethyl aniline	100-61-8	2	9	X	0.5	2	-	-	-	-	X
Morpholine	110-91-8	20	70	X	20	70	30	105	-	-	X
Naphtha (Coal tar)	8030-30-6	100	400	-	100	400	-	-	-	-	-
Naphthalene	91-20-3	10	50	-	10	50	15	75	-	-	-
alpha-Naphthylamine; see 1910.1004	134-32-7										
beta-Naphthylamine; see 1910.1009	91-59-8										

TABLE 2-1-A. Limits For Air Contaminants

TABLE 1-1-A. Limits for Air Contaminants											
Substance	CAS No.	Transitional Limits			Final Rule Limits**						
		PEL ^a		Skin Designation	TWA		STEL ^c		CEILING		Skin Designation
		ppm ^a	mg/m ³ ^b		ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b	
Nickel carbonyl (as Ni)	13463-39-3	0.001	0.007	-	0.001	0.007	-	-	-	-	-
Nickel, metal and insoluble compounds (as Ni)	7440-02-0	-	1	-	-	1	-	-	-	-	-
Nickel, soluble compounds (as Ni)	7440-02-0	-	1	-	-	0.1	-	-	-	-	-
Nicotine	54-11-5	-	0.5	X	-	0.5	-	-	-	-	X
Nitric acid	7697-37-2	2	5	-	2	5	4	10	-	-	-
Nitric oxide	10102-43-9	25	30	-	25	30	-	-	-	-	-
p-Nitroaniline	100-01-6	1	6	X	-	3	-	-	-	-	X
Nitrobenzene	98-95-3	1	5	X	1	5	-	-	-	-	X
p-Nitrochlorobenzene	100-00-5	-	1	X	-	1	-	-	-	-	X
4-Nitrodiphenyl; see 1910.1003	92-93-3	-	-	-	-	-	-	-	-	-	-

TABLE Z-1-A. Limits For Air Contaminants

Substance	CAS No.	Transitional Limits			Skin Designation	Final Rule Limits**						Skin Designation
		PEL ^a		mg/m ³ ^b		TWA		STEL ^c		CEILING		
		ppm ^a				ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b	
Nitroethane	79-24-3	100	310	-	100	310	-	-	-	-	-	-
Nitrogen dioxide	10102-44-0	(C)5	(C)9	-	-	-	1	1.8	-	-	-	-
Nitrogen trifluoride	7783-54-2	10	29	-	10	29	-	-	-	-	-	-
Nitroglycerin	55-63-0	(C)0.2	(C)1	X	-	-	-	0.1	-	-	-	X
Nitromethane	75-52-5	100	250	-	100	250	-	-	-	-	-	-
1-Nitropropane	108-03-2	25	90	-	25	90	-	-	-	-	-	-
2-Nitropropane	79-46-9	25	90	-	10	35	-	-	-	-	-	-
N-Nitrosodimethylamine; see 1910.1016	62-75-9											
Nitrotoluene												
o-isomer	88-72-2;											
m-isomer	99-08-1;	5	30	X	2	11	-	-	-	-	-	X
p-isomer	99-99-0											
Nitrotrichloromethane; see Chloropicrin												

TABLE Z-1-A. Limits For Air Contaminants

Substance	CAS No.	Transitional Limits			Final Rule Limits**					
		PEL*		Skin Designation	TWA		STEL ^c		CEILING	
		ppm ^a	mg/m ³ ^b		ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b
Nonane	111-84-2	-	-	-	200	1050	-	-	-	-
Octachloronaphthalene	2234-13-1	-	0.1	X	-	0.1	-	0.3	-	-
Octane	111-65-9	500	2350	-	300	1450	375	1800	-	-
Oil mist, mineral	8012-95-1	-	5	-	-	5	-	-	-	-
Osmium tetroxide (as Os)	20816-12-0	-	0.002	-	0.0002	0.002	0.0006	0.006	-	-
Oxalic acid	144-62-7	-	1	-	-	1	-	2	-	-
Oxygen difluoride	7783-41-7	0.05	0.1	-	-	-	-	-	0.05	0.1
Ozone	10028-15-6	0.1	0.2	-	0.1	0.2	0.3	0.6	-	-
Paraffin wax fume	8002-74-2	-	-	-	-	2	-	-	-	-
Paraquat, respirable dust	4685-14-7	-	0.5	X	-	0.1	-	-	-	-
Parathion	56-38-2	-	0.1	X	-	0.1	-	-	-	-
Particulates not otherwise regulated	--	-	-	-	-	-	-	-	-	-
Total dust	--	-	15	-	-	15	-	-	-	-
Respirable fraction	--	-	5	-	-	5	-	-	-	-

TABLE Z-1-A. Limits For Air Contaminants

Substance	CAS No.	Transitional Limits			Final Rule Limits**					
		PEL*		Skin Designation	TWA		STEL ^c		CEILING	
		ppm ^a	mg/m ³ ^b		ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b
Pentaborane	19624-22-7	0.005	0.01	-	0.005	0.01	0.015	0.03	-	-
Pentachloronaphthalene	1321-64-8	-	0.5	X	-	0.5	-	-	-	X
Pentachlorophenol	87-86-5	-	0.5	X	-	0.5	-	-	-	X
Pentaerythritol	115-77-5	-	-	-	-	-	-	-	-	-
Total dust		-	15	-	-	10	-	-	-	-
Respirable fraction		-	5	-	-	5	-	-	-	-
Pentane	109-66-0	1000	2950	-	600	1800	750	2250	-	-
2-Pentanone (Methyl propyl ketone)	107-87-9	200	700	-	200	700	250	875	-	-
Perchloroethylene (Tetrachloroethylene)	127-18-4	See Table Z-2			25	170	-	-	-	-
Perchloromethyl mercaptan	594-42-3	0.1	0.8	-	0.1	0.8	-	-	-	-
Perchloryl fluoride	7616-94-6	3	13.5	-	3	14	6	28	-	-

TABLE Z-1-A. Limits For Air Contaminants

Transitional Limits					Final Rule Limits**						
Substance	CAS No.	PEL*		Skin Designation	TWA		SIEL ^c		CEILING		Skin Designation
		ppm ^a	mg/m ³ ^b		ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b	
Perlite	—	—	—	—	—	—	—	—	—	—	—
Total dust		—	15	—	—	15	—	—	—	—	—
Respirable fraction		—	5	—	—	5	—	—	—	—	—
Petroleum distillates											
(Naphtha)	8002-05-9	500	2000	—	400	1600	—	—	—	—	—
Phenol	108-95-2	5	19	X	5	19	—	—	—	—	X
Phenothiazine	92-84-2	—	—	—	—	5	—	—	—	—	X
p-Phenylene diamine	106-50-3	—	0.1	X	—	0.1	—	—	—	—	X
Phenyl ether, vapor	101-84-8	1	7	—	1	7	—	—	—	—	—
Phenyl ether-biphenyl mixture, vapor	—	1	7	—	1	7	—	—	—	—	—
Phenylethylene; see Styrene											
Phenyl glycidyl ether (PGE)	122-60-1	10	60	—	1	6	—	—	—	—	—

TABLE Z-1-A. Limits For Air Contaminants

Substance	CAS No.	Transitional Limits			Skin Designation	Final Rule Limits**						Skin Designation	
		PEL*		ppm ^a		mg/m ³ ^b	TWA		STEL ^c		CEILING		
		ppm ^a	mg/m ³ ^b				ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b	ppm ^a		mg/m ³ ^b
Phenylhydrazine	100-63-0	5	22	X	5	20	10	45	-	-	X		
Phenyl mercaptan	108-98-5	-	-	-	0.5	2	-	-	-	-	-		
Phenylphosphine	638-21-1	-	-	-	-	-	-	-	0.05	0.25	-		
Phorate	298-02-2	-	-	-	-	0.05	-	0.2	-	-	X		
Phosdrin (Mevinphos ^R)	7786-34-7	-	0.1	X	0.01	0.1	0.03	0.3	-	-	X		
Phosgene (Carbonyl chloride)	75-44-5	0.1	0.4	-	0.1	0.4	-	-	-	-	-		
Phosphine	7803-51-2	0.3	0.4	-	0.3	0.4	1	1	-	-	-		
Phosphoric acid	7664-38-2	-	1	-	-	1	-	3	-	-	-		
Phosphorus (yellow)	7723-14-0	-	0.1	-	-	0.1	-	-	-	-	-		
Phosphorus oxychloride	10025-87-3	-	-	-	0.1	0.6	-	-	-	-	-		
Phosphorus penta- chloride	10026-13-8	-	1	-	-	1	-	-	-	-	-		
Phosphorus pentasulfide	1314-80-3	-	1	-	-	1	-	3	-	-	-		

TABLE Z-1-A. Limits For Air Contaminants

Substance	CAS No.	Transitional Limits			Final Rule Limits**					
		PEL*		Skin Designation	TWA		STEL ^c		CELLING	
		ppm ^a	mg/m ³ ^b		ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b
Phosphorus trichloride	7719-12-2	0.5	3	-	0.2	1.5	0.5	3	-	-
Phthalic anhydride	85-44-9	2	12	-	1	6	-	-	-	-
m-Phthalodinitrile	626-17-5	-	-	-	-	5	-	-	-	-
Picloram	1918-02-1	-	-	-	-	-	-	-	-	-
Total dust		-	15	-	-	10	-	-	-	-
Respirable fraction		-	5	-	-	5	-	-	-	-
Picric acid	88-89-1	-	0.1	X	-	0.1	-	-	-	X
Piperazine dihydrochloride	142-64-3	-	-	-	-	5	-	-	-	-
Pindone (2-Pivalyl-1,3-indandione)	83-26-1	-	0.1	-	-	0.1	-	-	-	-
Plaster of Paris	7778-18-9	-	-	-	-	-	-	-	-	-
Total dust		-	15	-	-	15	-	-	-	-
Respirable fraction		-	5	-	-	5	-	-	-	-

TABLE Z-1-A. Limits For Air Contaminants

Substance	CAS No.	Transitional Limits			Final Rule Limits**					
		PEL*		Skin Designation	TWA		STEL ^c		CEILING	
		ppm ^a	mg/m ³ ^b		ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b
Platinum (as Pt)	7440-06-4									
Metal		-	-	-	-	1	-	-	-	-
Soluble salts		-	0.002	-	-	0.002	-	-	-	-
Portland cement	65997-15-1									
Total dust			See Table Z-3		-	10	-	-	-	-
Respirable fraction			See Table Z-3		-	5	-	-	-	-
Potassium hydroxide	1310-58-3	-	-	-	-	-	-	-	2	-
Propane	74-98-6	1000	1800	-	1000	1800	-	-	-	-
Propargyl alcohol	107-19-7	-	-	-	1	2	-	-	-	X
beta-Propiolactone; see 1910.1013	57-57-8									
Propionic acid	79-09-4	-	-	-	10	30	-	-	-	-
Propoxur (Baygon)	114-26-1	-	-	-	-	0.5	-	-	-	-
n-Propyl acetate	109-60-4	200	840	-	200	840	250	1050	-	-
n-Propyl alcohol	71-23-8	200	500	-	200	500	250	625	-	-

TABLE Z-1-A. Limits For Air Contaminants

Substance	CAS No.	Transitional Limits			Skin Designation	Final Rule Limits**						Skin Designation	
		* PEL		b		TWA		STEL ^c		CEILING			b
		ppm ^a	mg/m ³			ppm ^a	mg/m ³	ppm ^a	mg/m ³	ppm ^a	mg/m ³		
n-Propyl nitrate	627-13-4	25	110	-	25	105	40	170	-	-	-	-	
Propylene dichloride	78-87-5	75	350	-	75	350	110	510	-	-	-	-	
Propylene glycol dinitrate	6423-43-4	-	-	-	0.05	0.3	-	-	-	-	-	-	
Propylene glycol mono-methyl ether	107-98-2	-	-	-	100	360	150	540	-	-	-	-	
Propylene imine	75-55-8	2	5	X	2	5	-	-	-	-	-	X	
Propylene oxide	75-56-9	100	240	-	20	50	-	-	-	-	-	-	
Propyne; see Methyl acetylene													
Pyrethrum	8003-34-7	-	5	-	-	5	-	-	-	-	-	-	
Pyridine	110-86-1	5	15	-	5	15	-	-	-	-	-	-	
Quinone	106-51-4	0.1	0.4	-	0.1	0.4	-	-	-	-	-	-	
Resorcinol	108-46-3	-	-	-	10	45	20	90	-	-	-	-	

TABLE Z-1-A. Limits For Air Contaminants

Substance	CAS No.	Transitional Limits		Skin Designation	Final Rule Limits**						Skin Designation
		PEL*			TWA		STEL ^c		CEILING		
		ppm ^a	mg/m ³ ^b		ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b	
Rhodium (as Rh), metal fume and insoluble compounds	7440-16-6	-	0.1	-	-	0.1	-	-	-	-	-
Rhodium (as Rh), soluble compounds	7440-16-6	-	0.001	-	-	0.001	-	-	-	-	-
Ronnel	299-84-3	-	15	-	-	10	-	-	-	-	-
Rosin core solder pyrolysis products, as formaldehyde	—	-	-	-	-	0.1	-	-	-	-	-
Rotenone	83-79-4	-	5	-	-	5	-	-	-	-	-
Rouge	—	-	-	-	-	-	-	-	-	-	-
Total dust		-	15	-	-	10	-	-	-	-	-
Respirable fraction		-	5	-	-	5	-	-	-	-	-
Selenium compounds (as Se)	7782-49-2	-	0.2	-	-	0.2	-	-	-	-	-
Selenium hexafluoride (as Se)	7783-79-1	0.05	0.4	-	0.05	0.4	-	-	-	-	-

TABLE Z-1-A. Limits For Air Contaminants

Substance	CAS No.	Transitional Limits		Skin Designation	Final Rule Limits**						Skin Designation	
		PEL*			TWA		STEL ^c		CEILING			
		ppm ^a	mg/m ³ ^b		ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b		
Silica, amorphous, precipitated and gel	—	See Table Z-3			—	6	—	—	—	—	—	—
Silica, amorphous, diatomaceous earth, containing less than 1% crystalline silica	68855-54-9	See Table Z-3			—	6	—	—	—	—	—	—
Silica, crystalline cristobalite (as quartz), respirable dust	14464-46-1	See Table Z-3			—	0.05	—	—	—	—	—	—
Silica, crystalline quartz (as quartz), respirable dust	14808-60-7	See Table Z-3			—	0.1	—	—	—	—	—	—
Silica, crystalline tripoli (as quartz), respirable dust	1317-95-9	See Table Z-3			—	0.1	—	—	—	—	—	—

TABLE Z-1-A. Limits For Air Contaminants

Substance	CAS No.	Transitional Limits		Skin Designation	Final Rule Limits**						Skin Designation	
		PEL*			TWA		STEL ^C		CEILING			
		ppm ^a	mg/m ³ ^b		ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b		
Silica, crystalline tridymite (as quartz), respirable dust	15468-32-3		See Table Z-3		-	0.05	-	-	-	-	-	
Silica, fused, respirable dust	60676-86-0		See Table Z-3		-	0.1	-	-	-	-	-	
Silicates (less than 1% crystalline silica)												
Mica (respirable dust)	12001-26-2		See Table Z-3		-	3	-	-	-	-	-	
Soapstone, total dust	—		See Table Z-3		-	6	-	-	-	-	-	
Soapstone, respirable dust	—		See Table Z-3		-	3	-	-	-	-	-	
Talc (containing asbestos): use asbestos limit	—		See Table Z-3		See 29 CFR 1910.1001							
Talc (containing no asbestos), asbestos), respirable dust	14807-96-6		See Table Z-3		-	2	-	-	-	-	-	
Tremolite			See Table Z-3		See 29 CFR 1910.1101							

TABLE Z-1-A. Limits For Air Contaminants

Substance	CAS No.	Transitional Limits			Skin Designation	Final Rule Limits**						Skin Designation
		PEL*		TWA		STEL ^c		CEILING				
		ppm ^a	mg/m ³ ^b			ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b			
Silicon	7440-21-3											
Total dust		-	15	-	-	10	-	-	-	-	-	-
Respirable fraction		-	5	-	-	5	-	-	-	-	-	-
Silicon carbide	409-21-2											
Total dust		-	15	-	-	10	-	-	-	-	-	-
Respirable fraction		-	5	-	-	5	-	-	-	-	-	-
Silicon tetrahydride	7803-62-5	-	-	-	5	7	-	-	-	-	-	-
Silver, metal												
dust and fume (as Ag)	7440-22-4	-	0.01	-	-	0.01	-	-	-	-	-	-
Soapstone; see Silicates												
Sodium azide	26628-22-8											
(as HN ₃)		-	-	-	-	-	-	-	0.1	-	X	
(as NaN ₃)		-	-	-	-	-	-	-	-	0.3	X	
Sodium bisulfite	7631-90-5	-	-	-	-	5	-	-	-	-	-	-
Sodium fluoroacetate	62-74-8	-	0.05	X	-	0.05	-	0.15	-	-	X	
Sodium hydroxide	1310-73-2	-	2	-	-	-	-	-	-	2	-	-

TABLE Z-1-A. Limits For Air Contaminants

Substance	CAS No.	Transitional Limits			Final Rule Limits**					
		PEL*		Skin Designation	TWA		STEL ^C		CEILING	
		ppm ^a	mg/m ³ ^b		ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b
Sodium metabisulfite	7681-57-4	-	-	-	-	5	-	-	-	-
Starch	9005-25-8	-	-	-	-	-	-	-	-	-
Total dust		-	15	-	-	15	-	-	-	-
Respirable fraction		-	5	-	-	5	-	-	-	-
Stibine	7803-52-3	0.1	0.5	-	0.1	0.5	-	-	-	-
Stoddard solvent	8052-41-3	500	2900	-	100	525	-	-	-	-
Strychnine	57-24-9	-	0.15	-	-	0.15	-	-	-	-
Styrene	100-42-5	-	See Table Z-2	-	50	215	100	425	-	-
Subtilisins (Proteolytic enzymes)	1395-21-7	-	-	-	-	-	-	-	0.00006	-
Sucrose	57-50-1	-	-	-	-	-	-	-	-	-
Total dust		-	15	-	-	15	-	-	-	-
Respirable fraction		-	5	-	-	5	-	-	-	-
Sulfur dioxide	7446-09-5	5	13	-	2	5	5	10	-	-
Sulfur hexafluoride	2551-62-4	1000	6000	-	1000	6000	-	-	-	-
Sulfuric acid	7664-93-9	-	1	-	-	1	-	-	-	-

TABLE Z-1-A. Limits For Air Contaminants

Substance	CAS No.	Transitional Limits			Final Rule Limits**						
		PEL ^a		Skin Designation	TWA		SIEL ^c		CEILING		Skin Designation
		ppm ^a	mg/m ³ ^b		ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b	
Sulfur monochloride	10025-67-9	1	6	-	-	-	-	-	1	6	-
Sulfur pentafluoride	5714-22-7	0.025	0.25	-	-	-	-	-	0.01	0.1	-
Sulfur tetrafluoride	7783-60-0	-	-	-	-	-	-	-	0.1	0.4	-
Sulfuryl fluoride	2699-79-8	5	20	-	5	20	10	40	-	-	-
Sulprofos	35400-43-2	-	-	-	-	1	-	-	-	-	-
Systox ^R , see Demeton											
2,4,5-T	93-76-5	-	10	-	-	10	-	-	-	-	-
Talc; see Silicates											
Tantalum, metal											
and oxide dust	7440-25-7	-	5	-	-	5	-	-	-	-	-
TEDP (Sulfotep)	3689-24-5	-	0.2	X	-	0.2	-	-	-	-	X
Tellurium and compounds (as Te)	13494-80-9	-	0.1	-	-	0.1	-	-	-	-	-
Tellurium hexafluoride (as Te)	7783-80-4	0.02	0.2	-	0.02	0.2	-	-	-	-	-

TABLE Z-1-A. Limits For Air Contaminants

Substance	CAS No.	Transitional Limits			Final Rule Limits**					
		PEL*		Skin Designation	TWA		STEL ^C		CEILING	
		ppm ^a	mg/m ³ ^b		ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b
Temephos	3383-96-8									
Total dust		-	15	-	-	10	-	-	-	-
Respirable fraction		-	5	-	-	5	-	-	-	-
TEPP	107-49-3	-	0.05	X	-	0.05	-	-	-	X
Terphenyls	26140-60-3	(C)1	(C)9	-	-	-	-	-	0.5	5
1,1,1,2-Tetrachloro-2,2-difluoroethane	76-11-9	500	4170	-	500	4170	-	-	-	-
1,1,2,2-Tetrachloro-1,2-difluoroethane	76-12-0	500	4170	-	500	4170	-	-	-	-
1,1,2,2-Tetrachloroethane	79-34-5	5	35	X	1	7	-	-	-	X
Tetrachloroethylene; see Perchloroethylene										
Tetrachloromethane; see Carbon tetrachloride										
Tetrachloronaphthalene	1335-88-2	-	2	X	-	2	-	-	-	X

TABLE Z-1-A. Limits For Air Contaminants

Substance	CAS No.	Transitional Limits			Skin Designation	Final Rule Limits**						Skin Designation	
		PEL*		ppm ^a		mg/m ³ ^b	TWA		STEL ^c		CEILING		
		ppm ^a	mg/m ³ ^b				ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b	ppm ^a		mg/m ³ ^b
Tetraethyl lead (as Pb)	78-00-2	-	0.075	X	-	0.075	-	-	-	-	X		
Tetrahydrofuran	109-99-9	200	590	-	200	590	250	735	-	-	-		
Tetramethyl lead, (as Pb)	75-74-1	-	0.075	X	-	0.075	-	-	-	-	X		
Tetramethyl succino- nitrile	3333-52-6	0.5	3	X	0.5	3	-	-	-	-	X		
Tetranitromethane	509-14-8	1	8	-	1	8	-	-	-	-	-		
Tetrasodium pyro- phosphate	7722-88-5	-	-	-	-	5	-	-	-	-	-		
Tetryl (2,4,6-Trinitro- phenyl-methyl-nitramine)	479-45-8	-	1.5	X	-	0.1	-	-	-	-	X		
Thallium, soluble com- pounds (as Ti)	7440-28-0	-	0.1	X	-	0.1	-	-	-	-	X		
4,4'-Thiobis(6-tert, Butyl-m-cresol)	96-69-5	-	-	-	-	-	-	-	-	-	-		
Total dust		-	15	-	-	10	-	-	-	-	-		
Respirable fraction		-	5	-	-	5	-	-	-	-	-		

TABLE Z-1-A. Limits For Air Contaminants

Substance	CAS No.	Transitional Limits			Final Rule Limits**					
		PEL*		Skin Designation	TWA		STEL ^c		CEILING	
		ppm ^a	mg/m ³ ^b		ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b
Thioglycolic acid	68-11-1	-	-	-	1	4	-	-	-	-
Thionyl chloride	7719-09-7	-	-	-	-	-	-	-	1	5
Thiram	137-26-8	-	5	-	-	5	-	-	-	-
Tin, inorganic compounds (except oxides) (as Sn)	7440-31-5	-	2	-	-	2	-	-	-	-
Tin, organic compounds (as Sn)	7440-31-5	-	0.1	-	-	0.1	-	-	-	-
Tin oxide (as Sn)	7440-31-5	-	-	-	-	2	-	-	-	-
Titanium dioxide	13463-67-7	-	-	-	-	-	-	-	-	-
Total dust		-	15	-	-	10	-	-	-	-
Respirable fraction		-	5	-	-	5	-	-	-	-
Toluene	108-88-3	See Table Z-2			100	375	150	560	-	-
Toluene-2,4-diisocyanate (TDI)	584-84-9	(C)0.02	(C)0.14	-	0.005	0.04	0.02	0.15	-	-
m-Toluidine	108-44-1	-	-	-	2	9	-	-	-	-
o-Toluidine	95-53-4	5	22	X	5	22	-	-	-	-

TABLE Z-1-A. Limits For Air Contaminants

Substance	CAS No.	Transitional Limits			Final Rule Limits**						Skin Designation
		PEL*		Skin Designation	TWA		STEL ^c		CEILING		
		ppm ^a	mg/m ³ ^b		ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b	
p-Toluidine	106-49-0	-	-	-	2	9	-	-	-	-	X
Toxaphene; see Chlorinated camphene											
Tremolite; see Silicates											
Tributyl phosphate	126-73-8	-	5	-	0.2	2.5	-	-	-	-	-
Trichloroacetic acid	76-03-9	-	-	-	1	7	-	-	-	-	-
1,2,4-Trichlorobenzene	120-82-1	-	-	-	-	-	-	-	5	40	-
1,1,1-Trichloroethane; see Methyl chloroform											
1,1,2-Trichloroethane	79-00-5	10	45	X	10	45	-	-	-	-	X
Trichloroethylene	79-01-6		See Table Z-2		50	270	200	1080	-	-	-
Trichloromethane; see Chloroform											
Trichloronaphthalene	1321-65-9	-	5	X	-	5	-	-	-	-	X
1,2,3-Trichloropropane	96-18-4	50	300	-	10	60	-	-	-	-	-

TABLE Z-1-A. Limits For Air Contaminants

Substance	CAS No.	Transitional Limits		Skin Designation	Final Rule Limits**						Skin Designation
		PEL*			TWA		STEL ^c		CEILING		
		ppm ^a	mg/m ³ ^b		ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b	
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	1000	7600	-	1000	7600	1250	9500	-	-	-
Triethylamine	121-44-8	25	100	-	10	40	15	60	-	-	-
Trifluorobromomethane	75-63-8	1000	6100	-	1000	6100	-	-	-	-	-
Trimellitic anhydride	552-30-7	-	-	-	0.005	0.04	-	-	-	-	-
Trimethylamine	75-50-3	-	-	-	10	24	15	36	-	-	-
Trimethyl benzene	25551-13-7	-	-	-	25	125	-	-	-	-	-
Trimethyl phosphite	121-45-9	-	-	-	2	10	-	-	-	-	-
2,4,6-Trinitrophenyl; see Picric acid											
2,4,6-Trinitrophenylmethyl nitramine; see Tetryl											
2,4,6-Trinitrotoluene (TNT)	118-96-7	-	1.5	X	-	0.5	-	-	-	-	X
Triorthocresyl phosphate	78-30-8	-	0.1	-	-	0.1	-	-	-	-	X

TABLE Z-1-A. Limits For Air Contaminants

Substance	CAS No.	Transitional Limits			Final Rule Limits**					
		PEL*		Skin Designation	TWA		STEL ^c		CEILING	
		ppm ^a	mg/m ³ ^b		ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b
Triphenyl amine	603-34-9	-	-	-	-	5	-	-	-	-
Triphenyl phosphate	115-86-6	-	3	-	-	3	-	-	-	-
Tungsten (as W)	7440-33-7	-	-	-	-	5	-	10	-	-
Insoluble compounds		-	-	-	-	1	-	3	-	-
Soluble compounds		-	-	-	-	1	-	3	-	-
Turpentine	8006-64-2	100	560	-	100	560	-	-	-	-
Uranium (as U)	7440-61-1	-	-	-	-	-	-	-	-	-
Soluble compounds		-	0.05	-	-	0.05	-	-	-	-
Insoluble compounds		-	0.25	-	-	0.2	-	0.6	-	-
n-Valeraldehyde	110-62-3	-	-	-	50	175	-	-	-	-
Vanadium	1314-62-1	-	-	-	-	-	-	-	-	-
Respirable dust		-	-	-	-	-	-	-	-	-
(as V ₂ O ₅)		-	(C)0.5	-	-	0.05	-	-	-	-
Fume (as V ₂ O ₅)		-	(C)0.1	-	-	0.05	-	-	-	-
Vegetable oil mist	-	-	-	-	-	-	-	-	-	-
Total dust		-	15	-	-	15	-	-	-	-
Respirable fraction		-	5	-	-	5	-	-	-	-

TABLE Z-1-A. Limits For Air Contaminants

Substance	CAS No.	Transitional Limits			Final Rule Limits**							Skin Designation
		PEL*		Skin Designation	TWA		STEL ^c		CEILING			
		ppm ^a	mg/m ³ ^b		ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b		
Vinyl acetate	108-05-4	-	-	-	10	30	20	60	-	-	-	
Vinyl benzene; see Styrene												
Vinyl bromide	593-60-2	-	-	-	5	20	-	-	-	-	-	
Vinyl chloride; see 1910.1017	75-01-4											
Vinylcyanide; see Acrylonitrile												
Vinyl cyclohexene dioxide	106-87-6	-	-	-	10	60	-	-	-	-	X	
Vinylidene chloride (1,1-Dichloro- ethylene)	75-35-4	-	-	-	1	4	-	-	-	-	-	
Vinyl toluene	25013-15-4	100	480	-	100	480	-	-	-	-	-	
VM & P Naphtha	8032-32-4	-	-	-	300	1350	400	1800	-	-	-	
Warfarin	81-81-2	-	0.1	-	-	0.1	-	-	-	-	-	

TABLE Z-1-A. Limits For Air Contaminants

Substance	CAS No.	Transitional Limits		Skin Designation	Final Rule Limits**						Skin Designation	
		PEL*			TWA		STEL ^c		CEILING			
		ppm ^a	mg/m ³ ^b		ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b		
Welding fumes (total particulate)***	--	-	-	-	-	5	-	-	-	-	-	-
Wood dust, all soft and hard woods, except Western red cedar	--	-	-	-	-	5	-	10	-	-	-	-
Wood dust, Western red cedar	--	-	-	-	-	2.5	-	-	-	-	-	-
Xylenes (o-, m-, p- isomers)	1330-20-7	100	435	-	100	435	150	655	-	-	-	-
m-Xylene alpha, alpha'- diamine	1477-55-0	-	-	-	-	-	-	-	-	0.1	X	X
Xylidine	1300-73-8	5	25	X	2	10	-	-	-	-	-	X
Yttrium	7440-65-5	-	1	-	-	1	-	-	-	-	-	-
Zinc chloride fume	7646-85-7	-	1	-	-	1	-	2	-	-	-	-
Zinc chromate (as CrO ₃)	Varies with Compound	See Table Z-2		-	-	-	-	-	-	0.1	-	-

TABLE Z-1-A. Limits For Air Contaminants

Substance	CAS No.	Transitional Limits			Final Rule Limits**					
		PEL ^a		Skin Designation	TWA		STEL ^c		CEILING	
		ppm ^a	mg/m ³ ^b		ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b
Zinc oxide fume	1314-13-2	-	5	-	-	5	-	10	-	-
Zinc oxide	1314-13-2									
Total dust		-	15	-	-	10	-	-	-	-
Respirable fraction		-	5	-	-	5	-	-	-	-
Zinc stearate	557-05-1									
Total dust		-	15	-	-	10	-	-	-	-
Respirable fraction		-	5	-	-	5	-	-	-	-
Zirconium compounds										
(as Zr)	7440-67-7	-	5	-	-	5	-	10	-	-

* The transitional PELs are 8-hour TWAs unless otherwise noted; a (C) designation denotes a ceiling limit.

** Unless otherwise noted, employers in General Industry (i.e., those covered by 29 CFR 1910) may use any combination of controls to achieve these limits for a period not to exceed 4 years from the effective date of this standard; for employers operating Marine Terminals (i.e., those covered by 29 CFR 1918), any combination of controls may be used until further notice.

*** As determined from breathing-zone air samples.

a Parts of vapor or gas per million parts of contaminated air by volume at 25°C and 760 torr.

b Approximate milligrams of substance per cubic meter of air.

c Duration is for 15 minutes, unless otherwise noted.

d The final benzene standard in 1910.1028 applies to all occupational exposures to benzene except some subsegments of industry where exposures are consistently under the action level (i.e., distribution and sale of fuels, sealed containers and pipelines, coke production, oil and gas drilling and production, natural gas processing, and the percentage exclusion for liquid mixtures); for the excepted subsegments, the benzene limits in Table Z-2 apply.

TABLE Z-2

Material	8-hour time weighted average	Acceptable ceiling concentration	Acceptable maximum peak above the acceptance ceiling concentration for an 8-hour shift	
			Concentration	Maximum duration
Benzene ¹ (Z37.40-1969).....	10 p.p.m.....	25 p.p.m.....	50 p.p.m.....	10 minutes.
Beryllium and beryllium compounds (Z37.29-1970).....	2 µg./M ³	5 µg./M ³	25 µg./M ³	30 minutes.
Cadmium fume (Z37.5-1970).....	0.1 mg./M ³	0.3 mg./M ³.....	.....	.....
Cadmium dust (Z37.5-1970).....	0.2 mg./M ³	0.6 mg./M ³.....	.....	.....
Carbon disulfide (Z37.3-1968).....	20 p.p.m.....	30 p.p.m.....	100 p.p.m.....	30 minutes.
Carbon tetrachloride (Z37.17-1967).....	10 p.p.m.....	25 p.p.m.....	200 p.p.m.....	5 minutes in any 4 hours.
Chromic acid and chromates (Z37.7-1971).....	.....	1 mg./10M ³.....	.....	.....
Ethylene dibromide (Z37.31-1970).....	20 p.p.m.....	30 p.p.m.....	50 p.p.m.....	5 minutes.
Ethylene dichloride (Z37.21-1969).....	50 p.p.m.....	100 p.p.m.....	200 p.p.m.....	5 minutes in any 3 hours.
Formaldehyde ² (ANSI Z-37.16-1967).....	3 ppm.....	5 ppm.....	10 ppm.....	30 minutes.
Hydrogen fluoride (Z37.28-1969).....	3 p.p.m.....	.....	.....	.....
Hydrogen sulfide (Z37.2-1966).....	.....	20 p.p.m.....	50 p.p.m.....	10 minutes once only if no other measurable exposure occurs.
Fluoride as dust (Z37.28-1969).....	2.5 mg./M ³.....	.....	.....	.....
Mercury (Z37.8-1971).....	.....	1 mg./10M ³.....	.....	.....
Methyl chloride (Z37.18-1969).....	100 p.p.m.....	200 p.p.m.....	300 p.p.m.....	5 minutes in any 3 hours.
Methylene chloride (Z37.23-1969).....	500 p.p.m.....	1,000 p.p.m.....	2,000 p.p.m.....	5 minutes in any 2 hours.
Organo (alkyl) mercury (Z37.30-1969).....	0.01 mg./M ³	0.04 mg./M ³.....	.....	.....
Styrene (Z37.15-1969).....	100 p.p.m.....	200 p.p.m.....	600 p.p.m.....	5 minutes in any 3 hours.
Tetrachloroethylene (Z37.22-1967).....	do.....	do.....	300 p.p.m.....	5 minutes in any 3 hours.
Toluene (Z37.12-1967).....	200 p.p.m.....	300 p.p.m.....	500 p.p.m.....	10 minutes.
Trichloroethylene (Z37.19-1967).....	100 p.p.m.....	200 p.p.m.....	300 p.p.m.....	5 minutes in any 2 hours.

¹ This standard applies to the industry segments exempt from the 1 ppm 8 hour TWA and 5 ppm STEL of the benzene standard at § 1910.1028. This standard also applies to any industry for which § 1910.1928 is stayed or otherwise not in effect.

² This standard applies to any industry for which § 1910.1048 is stayed or otherwise not in effect.

TABLE Z-3—MINERAL DUSTS

Substance	Mppcf ^a	Mg/M ³
Silica:		
Crystalline:		
Quartz (respirable).....	250 ¹	10mg/M ³ =
	%SiO ₂ + 5	%SiO ₂ + 2
Quartz (total dust).....		30mg/M ³
		%SiO ₂ + 2
Cristobalite: Use ½ the value calculated from the count or mass formulae for quartz.....		
Tridymite: Use ½ the value calculated from the formulae for quartz.....		
Amorphous, including natural diatomaceous earth.....	20	80mg/M ³
		%SiO ₂
Silicates (less than 1% crystalline silica):		
Mica.....	20	
Soapstone.....	20	
Talc (non-asbestos-form).....	20 ^a	
Talc (fibrous). Use asbestos limit.....		
Tremolite (see talc, fibrous)....		
Portland cement.....	50	
Graphite (natural).....	15	
Coal dust (respirable fraction less than 5% SiO ₂).....		2.4mg/M ³ or
For more than 5% SiO ₂		10mg/M ³
		%SiO ₂ + 2
Inert or Nuisance Dust:		
Respirable fraction.....	15	5mg/M ³
Total dust.....	50	15mg/M ³

NOTE: Conversion factors—mppcf × 35.3 = million particles per cubic meter = particles per c.c.

^aMillions of particles per cubic foot of air, based on impinger samples counted by light-field techniques.

¹The percentage of crystalline silica in the formula is the amount determined from air-borne samples, except in those instances in which other methods have been shown to be applicable.

^aBoth concentration and percent quartz for the application of this limit are to be determined from the fraction passing a size-selector with the following characteristics:

^aContaining < 1% quartz; if 1% quartz, use quartz limit.

Aerodynamic diameter (unit density sphere)	Percent passing selector
2	90
2.5	75
3.5	50
5.0	25
10	0

The measurements under this note refer to the use of an AEC instrument. The respirable fraction of coal dust is determined with a MRE, the figure corresponding to that of 2.4 Mg/M³ in the table for coal dust is 4.5 Mg/M³.

RELATED PUBLICATIONS

OSHA 3077 - Personal Protective Equipment

OSHA 3079 - Respiratory Protection

OSHA 3084 - Chemical Hazard Communication

OSHA 3110 - Access to Medical and Exposure Records

OSHA 3111 - Hazard Communication Guidelines for Compliance

A single free copy of any of the above publications can be obtained by sending a self-addressed mailing label to any OSHA Regional Office or to OSHA Publications, Room N-3101, U.S. Department of Labor, Washington, D.C. 20210.

OSHA 3104 - Hazard Communication - A Compliance Kit

This reference guide to step-by-step requirements for complying with the OSHA Hazard Communication Standard is available from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. For charge card orders, phone (202) 783-3238. Order Number: 929-022-000009. Price \$18 (domestic); \$22.50 (foreign).

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*These states and territories operate their own OSHA-approved job safety and health programs (the Connecticut and New York plans cover public employees only and OSHA currently is exercising concurrent private-sector Federal enforcement authority in California).

